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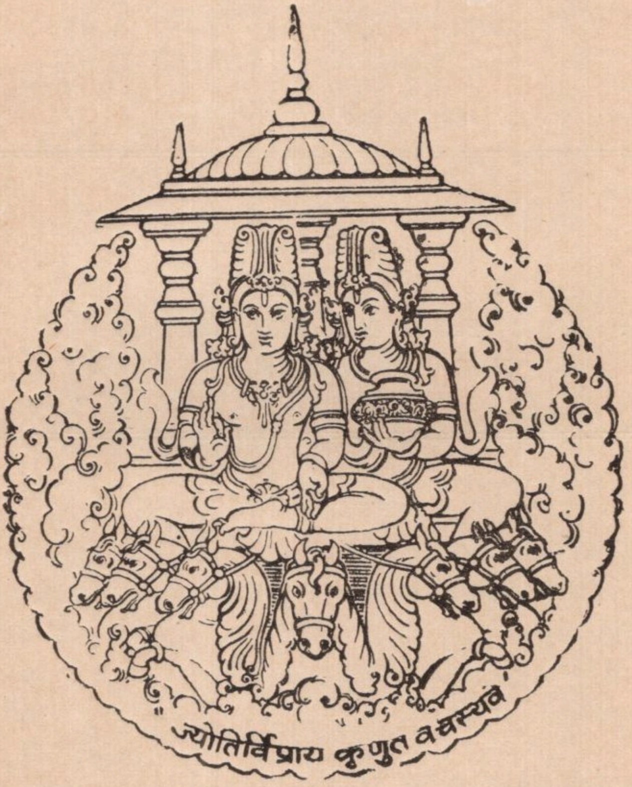

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Editorial

We are glad to bring out in this issue a special Research Review on "Pancha Karma Therapy *vis-a-vis* its Physio-Pathological Basis" written by Shri Gorakh Nath Chaturvedi under the guidance of Professor C. Dwarakanath for the benefit of all interested in the Fundamental Principles of Ayurveda. As is well known, the practice of various Pancha Karma measures produces a great cleanesing and rejuvenating effect on the body of chronic patients, and espicially, in elderly people. Inspite of the extensive usage of these measures throughout the ages, its scientific implications based on Ayurvedic Principles have not so far been brought out by any one in such a great detail as in the review so far.

This review, covering the Principles of Pancha Karma, will, therefore, be of much value to all those interested in the study of this special therapeutic measures of Ayurveda.

In fact, we are keen on publishing as many such studies as are available, in order to spread the basic principles of Ayurveda in the world and hope we will succeed in our efforts.

K. N. UDUPA
Chief Editor

A STUDY OF PANCHAKARMA THERAPY VIS-A-VIS ITS PHYSIO-PATHOLOGICAL BASIS*

(A MONOGRAPH)

(Received for publication on March 2, 1971)

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*Based on a Postgraduate Thesis for Higher Proficiency in Ayurveda (H. P. A.) in 1959, at the Post Graduate Training Centre in Ayurveda, Government of India, Jamnagar.

Chapter One

INTRODUCTION

SECTION I

THE RAISON D'ETRE FOR THE CHOICE OF PAÑCAKARMA THERAPY AS THE SUBJECT OF THIS THESIS.

The raison d'etre for the choice of *pañcakarma* therapy as the subject of this thesis is the importance attached to it by the three main Āyurvedic classics viz., Caraka and Suśruta Samhitās, and Aṣṭāṅga-samgraha and Hṛdaya. The measures comprehended by this therapy are : *vamana, virecana, nirūhabasti, anuvāsanabasti* and *sirovirecana*.[1] In general, the *pūrva* (preparatory) and *paścāt* (post) *Pañcakarma* measures such as *Snehana, Svedana* and *Samsarjanakrama* are also included in it.[2]

It may be said that, according to these classics, therapeutic measures comprehended by *Pañcakarma* therapy are the bed-rock of Āyurvedic approach to the treatment of disease—acute or chronic. In addition, this therapy appears to be also meant for being utilized in measures calculated to the preservation, maintenance and conservation of health and the promotion of longevity. It plays an important part in the regimen of *Svasṭhavṛtta*.[3] Caraka has indicated them as prophylactic measures in the context of epidemics and pandemics.[1]

---

[1] (i) कर्म पञ्चविधमुक्तं वमनादि ।
(Caraka : Sūtra : 26 : 10)

(ii) वमनं रेचनं नस्यं निरूहश्चानुवासनम् ।
एतानि पञ्च कर्माणि कथितानि मुनीश्वरैः ॥
(Śārṅgadhara : Uttara : 8 ; 63)

[2] (i) त्रिविधं कर्म-पूर्वकर्म, प्रधानकर्म, पश्चात् कर्मेति ।
(Suśruta : Sūtra : 5, 3)

and also × × × अन्ये तु संशोध्यस्य पाचनस्नेहनस्वेदनानि पूर्वकर्म, वमनविरेचनबस्तिनस्यसिरामोक्षणानि प्रधानं कर्म पेयाद्यन्नसंसर्जनं पश्चात् कर्म × × × ।
(Dalhaṇa on above)

(ii) का कल्पना पञ्चसु कर्मसूक्ता ।
Caraka : Siddhi : 1 ; 3)

and also × × × कल्पना शब्देनेह पञ्चकर्माङ्गकल्पना उच्यते, तेन पञ्चकर्माङ्गस्नेहस्वेदप्रयोगमेव प्रागाह ।
(Cakrapāṇī on, Ibid-6)

(iii) × × × क्रियाग्रहणात् स्नेहादीनि च्छेद्यादीनि च कर्माणि व्याख्यातानि ।
(Suśruta : Sūtra : 1 ; 38)

[3] (i) माधवे प्रथमे मासि नभस्य प्रथमे पुनः ।
सहस्य प्रथमे चैव हारयेद्दोषसंचयम् ॥
स्निग्धस्विन्नशरीराणामूर्ध्वं चाधश्च नित्यशः ।
बस्तिकर्म ततः कुर्यान्नस्यकर्म च बुद्धिमान् ॥
(Caraka : Sūtra : 7 ; 46-47)

(ii) हैमन्तिकं दोषचयं वसन्ते
प्रवाहयन् ग्रैष्मिकमभ्रकाले ।
घनात्यये वार्षिकमाशु सम्यक्
प्राप्नोति रोगानृतुजान्नजातु ॥
(Caraka : Śārīra : 2 ; 45)

The significance of *samśodhana* measures to the practice of medicine—preventive, conservative, and curative—can be seen from the emphasis laid on the adoption of them by Caraka. Says Caraka: "*Samśodhana, samśamana* and the avoidance, as well as the removal of *nidāna* (etiological factors) are measures of choice to be adopted, having regard to principles and rules enunciated for their application by a physician in respect of every and all diseases".[2]

Discussing the relative advantage of *samśodhana* over *samśamana* measures Caraka has stated that the former is calculated to the radical removal, from the body, of the morbific factors of diseases, whereas, in the case of the latter, relapses cannot be ruled out.[3] Suśruta has made a pertinent observation that, while *snehādikriyās* have an extensive applicability—both in medical and surgical diseases—surgical measures have a very limited indication and they are not applicable to diseases which can be treated with *snehādikriyās.*[4]

While these references relate to the treatment of abnormal states of health, it is seen that *Pañcakarma* measures should, as a rule, precede[5] *rasāyana* (rejuvenation therapy) and *vājīkaraṇa* (therapy for the promotion of virility, sexual stamina and productivity). In other words, the *Pañcakarma* therapy has direct reference to both the healthy and the ailing.

It is also seen from the *Carakasamhitā* that, even the classification of drugs has been

---

and also × × × प्रवाहयन् इत्यनेन यथा-
योग्यतया वमनादिनेति ज्ञेयम् ।

(Cakrapāṇi on above)

(iii) हरेद् वसन्ते श्लेष्माणं पित्तं शरदि निर्हरेत् ।
वर्षासु शमयेद् वायुं प्राग्विकारसमुच्छ्रयात् ॥

(Suśruta : Sūtra : 6 ; 38)

(iv) संधौ साधारणे तेषां दुष्टान् दोषान् विशोधयेत् ।
स्वस्थवृत्तमभिप्रेत्य, व्याधौ व्याधिवशेन तु ॥

(Aṣ. Hṛ. Sūtra : 13, 35)

(v) वमनैश्च विरेकैश्च निरूहैः सानुवासनैः ।
तथा स्वास्थ्यमवाप्नोति रोगेभ्यश्च प्रमुच्यते ॥

(Kāśyapa : Khila : 7, 15)

(vi) वक्ष्यामि तु क्रियामस्यां
अजा(ज्ञा)त व्याधिनाशनीम् ।

(Bhela : p. 25)

[1] येषां न मृत्युसामान्यं सामान्यं न च कर्मणाम् ।
कर्म पञ्चविधं तेषां भेषजं परमुच्यते ॥

(Caraka : Vimāna : 3 ; 13)

[2] संशोधनं संशमनं निदानस्य च परिवर्जनम् ।
एतावद् भिषजा कार्यं रोगे रोगे यथाविधि ॥

(Caraka : Vimāna 7 ; 30)

[3] दोषाः कदाचित् कुप्यन्ति जिता लंघनपाचनैः ।
जिताः संशोधनैर्येतु न तेषां पुनरुद्भवः ॥
दोषाणां च द्रुमाणां च मूलेऽनुपहते सति ।
रोगाणां प्रसवानां च गतानामागतिर्ध्रुवा ॥

(Caraka : Sūtra : 16 ; 20-21)

[4] द्विविधास्तु व्याधयः-शस्त्रसाध्या स्नेहादिक्रियासाध्याश्च। तत्र शस्त्रसाध्येषु स्नेहादिक्रिया न प्रतिषिध्यते, स्नेहादिक्रियासाध्येषु शस्त्रकर्म न क्रियते ।

(Suśruta : Sūtra : 24, 3)

and also × × × स्नेहादिक्रियासाध्या इति अत्रादि शब्देन स्वेदनवमनविरेचनादयः ।

(Dalhaṇa on above)

[5] (i) तस्यां संशोधनैः शुद्धः सुखी जातबलः पुनः ।
रसायनं प्रयुञ्जीत तत्प्रवक्ष्यामि शोधनम् ॥

(Caraka : Cikitsā ; 1-1, 24)

made according to their indications and use for various measures included under the *Pañcakarma* therapy.[1]

It is further seen, from the chapter on *Upakalpanīya* of the *Sūtrasthāna* of this *samhitā*, that the organisation and equipment of a hospital should be carried out, not only to meet various kinds of emergencies but also to provide for *Pūrva karma* (preparatory). *Pradhāna karma* (main) and *Paścāt karma* (post) measures, such as *snehana, svedana, vamana* etc., for all kinds of diseases.[2]

He has drawn pointed attention to the need for a physician to be fully qualified and equipped to undertake measures included under the *Pañcakarma* therapy and cautioned against hazards, including the occurence of new diseases superimposed upon old ones which may follow in the wake of faulty administration of these measures.[3]

Further, Caraka has observed that a physician should possess not only the knowledge of the *Pañcakarma* therapy but also know how to apply them scientifically.[4]

From all accounts available in the existing editions of *samhitā granthas* it is seen that

---

(ii) तस्मात्पुरा शोधनमेव कार्यं
बलानुरूपं न हि वृष्ययोगाः ।
सिध्यन्ति देहे मलिने प्रयुक्ता
क्लिष्टे यथा वाससि रागयोगाः ॥
(Caraka : Cikitsā : 2-1, 51)

[1] (i) अपामार्गस्य बीजानि पिप्पलीर्मरिचानि च ।
मारुतघ्नमिति प्रोक्तः संग्रहः पाञ्चकर्मिकः ॥
(Caraka : Sūtra 2 ; 3-14)

(ii) मृद्वीकामधुकमधुपर्णीमेदाविदारीकाकोलीक्षीरकाकोलीजीवकजीवन्तीशालपर्ण्य इति दशेमानि स्नेहोपगानि भवन्ति; × × × × × × ज्योतिष्मतीक्षवकमरिचपिप्पलीविडंगशिग्रुसर्षपापामार्गतण्डुलश्वेतामहाश्वेता इति दशेमानि शिरोविरेचनोपगानि भवन्ति, इति सप्तकः कषायवर्गः ।
(Caraka : Sūtra : 4 ; 13)

(iii) यानि तु खलु वमनादिषु भेषजद्रव्याण्युपयोगं गच्छन्ति तान्यनुव्याख्यास्यामः । तद्यथा-फलजीमूतक × × × तथाऽपराण्यनुक्तान्यपि द्रव्याणि यथायोगविहितानि शिरोविरेचनार्थमुपदिश्यन्त इति ।
(Caraka : Vimāna 8 : 135-151)

[2] [illegible] संभारान् विविधानपि समासेनोपदेक्ष्यामः; तद्यथा—दृढं निवातं × × × × समाख्यातानि चौषधानि, यच्चान्यदपि किञ्चिद्व्यापदः परिसंख्याय प्रतीकारार्थमुपकरणं विद्यात्, यच्च प्रतिभोगार्थं तत्तदुपकल्पयेत् ।
(Caraka : Sūtra : 15 : 6-7)

[3] (i) चिकित्साप्राभृतो धीमान् शास्त्रवान् कर्मतत्परः ।
नरं विरेचयति यं स योगात् सुखमश्नुते ॥
यं वैद्यमानी त्वबुधो विरेचयति मानवम् ।
सोऽतियोगादयोगाच्च मानवं दुःखमश्नुते ॥
(Caraka : Sūtra 16 : 3-4)

and also दुःखं विकारं; यदुक्तं—'विकारो दुखमेव तु' (सू० अ० ९)
(Cakrapāṇi on above)

(ii) अधिगतसर्वशास्त्रार्थमपि शिष्यं योग्यां कारयेत् ।
(Suśruta : Sūtra *9* ; 3)

and also स्नेहादिष्विति आदि शब्दात् स्वेदवमनविरेचनास्थापनानुवासनादीनां ग्रहणं, × × योग्या सम्यक् कर्माभ्यासः ।
(D·alhaṇa on above)

[4] तान्युपस्थितदोषाणां स्नेहस्वेदोपपादनैः ।
पञ्चकर्माणि कुर्वीत मात्राकालौ विचारयन् ॥
मात्राकालाश्रया युक्तिः सिद्धिर्युक्तौ प्रतिष्ठिता ।
तिष्ठत्युपरि युक्तिज्ञो द्रव्यज्ञानवतां सदा ॥
(Caraka : Sūtra : *2* ; 15-16)

the *saṃśodhana* (radical therapeutics) measures are meant, not only for the treatment of *śārīrika* (somatic) diseases but also in the treatment of *mānasika* (psychological and emotional) disturbances.[1]

Both Caraka and Kāśyapa have stated that the *Pañcakarma* therapy is not only meant for the ruler and the highly placed but also for the middle, lower as well as the poverty stricken classes of people.[2]

In the opinion of Bhela, he who is proficient in the administration of the *Pañcakarma* therapy is fit to be a royal physician.[3]

No doubt, the administration of *vamana* (emetics), *virecana* (purgatives), *basti* (enemata), *raktamokṣaṇa* (blood-letting) and *svedana* (the use of heat and steam to promote sweating) were in vogue, in the allopathic system of medicine, from the time of Hippocrates until recently when, many of these measures became conservative ones yielding to the rapidly developing therapeutics with sulphonamides, antibiotics etc. There are still a number of old time allopathic physicians who continue to make use of tartar emetic, ipecacuanha etc., to induce vomiting, administer cathartics and purgatives, employ enema and promote sweating by the internal administration of diaphoretics and external use of steam-bath (turkish-bath) etc. Blood-letting and the use of leeches as therapeutic measures, appear to have been virtually given up, even though, on occasions, the removal of blood from the vein is still done by some in cases of hypertension, eclampsia, epileptic seizures etc. Many of the therapies, referred to in the foregoing, appear to have had their origin in Greek medicine in Europe and, later, were developed by Arabian medicine (Ūnani Medicine) in the middle ages.

However, the *Pañcakarma* therapy which includes *snehana*, *svedana*, *vamana*, *virecana*, *nirūha* and *anuvāsanabastis*, *śirovirecana karma* and *saṃsārjana krama*, envisaged by Āyurveda, appear to be based on well known theories or doctrines—they being correlated to pathological events, involving various kinds of metabolic disturbances. In addition, the induction of emesis, according to Āyurveda, does not appear to be meant merely as a measure for the removal of phlegm and mucus from the chest of a patient suffering from congestion of the lung or to empty the contents of the stomach; the administration of enema is not meant merely to open up the bowel which may be heavily constipated or to wash out the colon or, the administration of nutrient enema, in desperate cases where, feeding through other channels has become well nigh impossible. On the other hand, a careful study of the Āyurvedic literature shows that these measures are not only emergency expedients to get over annoying situations but, each one of them constitute a specific measure which is to be applied, having regard to the particular type of *doṣic* disturbance and indications and contra-indications for their use. The patient, in this view, may have to be carefully prepared (*pūrvakarma*) before the administration of the one or the other of the measures included under the *Pañcakarma* therapy (*pradhāna-karma*), which may have to be followed by *samsarjana krama* or planned diet and post-therapeutic measures (*paścāt karma*). The entire concept of the *Pañcakarma* therapy would, therefore, appear to be based on the Āyurvedic theories of physiology and pathogenesis.

---

[1] तद्दुः खसंयोगा व्याधय उच्यन्ते । × × त एते मनः शरीराधिष्ठानाः । तेषां संशोधनसंशमनाहाराचाराः सम्यक् प्रयुक्ता निग्रहहेतवः ।

(Suśruta : Sūtra : *1* ; 23, 26-27)

[2] (i) अनेन विधिना राजा राजमात्रोऽथवा पुनः ।
यस्य वा विपुलं द्रव्यं स संशोधनमर्हति ॥
दरिद्रस्त्वापदं प्राप्य प्राप्तकालं विशोधनम् ।
पिबेत् काममसंभृत्य संभारानपि दुर्लभान् ॥

(Caraka : Sūtra : *15* ; 18-19)

(ii) चिकित्सितं पञ्चजनान् (द)
राज्ञो राजोपमस्य वा ।
धनिनां निर्धनानां वा
यथार्थमुपकल्पयेत् ॥

(Kāśyapa : Sūtra : *24* ; P. 32)

[3] पञ्चकर्मविधानज्ञो राजार्हो भिषगमु (गु) च्यते ।

(Bhela : Siddhi : P. 247)

It would, however, appear that this therapy in its different aspects, has ceased to be the therapy of choice in course of time, possibly, since a thousand years. It is seen that practitioners, in most parts of India, except in Karala, have preferred *rasauṣadhas* to the classical *Pañcakarma* therapy. An obvious explanation for this rather peculiar phenomenon would appear to be the emergence of *rasaśāstra* and the easy and effective application of *rasauṣadhas*. This view is borne out by the following passages extracted from what are claimed to be 13th century works on *rasaśāstra* viz. *Rasendrasārasamgraha* and *Rasapaddhati.*

"*Rasauṣadhas* are the best because they are capable of being administered in extremely small doses; they are not disagreeable to taste and they produce optimum beneficial effects in a short time".[1]

"*Cikitsā* is of three kinds, viz., *rasacikitsā* which is the best called *daivic* (divine), *ghṛta*, *cūrṇa*, *kaṣāya*, and the rest, which belong to *mānuṣī* (human), are the second best and, surgical treatment involving excision, incision etc. and tantric treatment belong to the most inferior type, known as the *āsuric*[2] demonic)."

In his introduction to *Rasataraṅgiṇī* Sri Sadānanda Śarma (edited by Śri Haridatta Śāstri) has quoted the following passage, from *Vṛddha vaidyas* :—

> "The superior type of physician is the *rasavaidya*, one who practises with herbs and the rest is of the mediocre type and the one who practises with surgical instruments and thermocautery belongs to the inferior type".[3]

The foregoing notwithstanding, the fact that Kerala, surrounded as it was by Chola

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[1] अल्पमात्रोपयोगित्वादरुचेरप्रसङ्गतः ।
क्षिप्रमारोग्यदायित्वादौषधेभ्योधिको रसः ।
(Rasendra Sāra Samgraha : *1* ; 4)

[2] सा दैवी प्रथमा सुसंस्कृतरसैर्या निर्मिता सद्रसै-
श्चूर्णस्नेहकषायलेहरचिता सा मानकी मध्यमा ।
शस्त्रच्छेदनलास्यलक्ष्मणकृताचाराधमा साऽऽसुरी-
त्यायुर्वेदरहस्यमेतदखिलं तिस्त्रश्चिकित्सा मताः ।।
(Rasapaddhati ; *1* ; 2)

[3] उत्तमो रसवैद्यस्तु मध्यमो मूलिकादिभिः ।
अधमः शस्त्रदाहाभ्यामित्थं वैद्यस्त्रिधा मतः ।।
(Rasataraṅgiṇī : Introdction : p. 1)

(present day Tiruchirapalli and Tanjore districts) and Pandya (present day Madurai, Tirunelveli and Ramnad districts) where *rasasiddhas* (Agastiyar, Therayr, Pullipani, Bogar and others) gave to the world, a highly developed *rasaśāstra*[1] which became the therapy of choice in the south. During the historical period, the *vaidyas* of Kerala appear to have conserved, developed and practised the *Pañcakarma* therapy of Ātreya, as compiled by Vāgabhaṭa, with very great success. It is seen, even today, that vaidyas of Kerala —the reputed *aṣṭavaidyas*—practise meticulously the *Pañcakarma* therapy with great success. The *rasauṣadhas* of the South Indian *Siddha* school or of the Nāgārjuna type of north India, do not appear to have influenced the Kerala vaidyas to any considerable extent.

It is well known that some aspects of the *Pañcakarma* therapy, known today as *navarakizi, pizichil, dhārā* etc., as developed and practised in Kerala are highly reputed. Patients from all parts of India—statesmen, politicians, administrators, business magnates and others—both rich and poor, educated and the uneducated alike—have benefitted by this treatment, especially those suffering from *vāta rogas* and certain forms of *mānasika rogas.* It is also on record that, even healthy persons have taken advantage of these thereapies periodically to keep themselves fit. Large number of Europeans, including civilians, in pre-independence days, were known to have resorted to this treatment with considerable benefit.[2]

The foregoing apart, which in themselves are sufficient to justify the choice of this subject for a critical and detailed study, the fact that (*a*) the *Pañcakarma* therapy is the mainstay of both Ātreya and Dhanvantari schools of medicine, (*b*) it represents an art, based on well known scientific doctrines and principles, (*c*) the scientific possibilities of this therapy have not yet been fully evaluated, especially in the context of recent developments in the fields of physio-therapy which later resemble in some respects certain aspects of *Pañcakarma* therapy, are additional reasons why this subject has been chosen by the author, for his special and critical study and thesis, (*d*) and, further, this mode of treatment is not merely one of historical importance and academic interest but its value and efficiency appear to be as good today as its was during the days of Punarvasu Ātreya, Caraka, Suśruta and Vāgbhaṭa.

SECTION II

MATERIALS AVAILABLE FOR STUDY

The author has drawn from and relied upon materials available, on this subject, from the following classical Āyurvedic literature :—

1. *Bhela Samhitā :* University of Calcutta Publication ; edition-1921.
2. *Kāśyapa Samhitā* or *Vṛddha Jīvakīya Tantra :* by Vṛddha Jīvaka, revised

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[1] *Pulasti*, the grand father of *Rāvaṇa* and *Rāvaṇa* himself. it is held, were great authorities on *Rasaśāstra.*

[2] Pañcakarma therapeutics was provided for : by "Aṣṭāṅga Poly Clinic", Adyar-Madras.

by Vastya, with introduction in Samskrit by Rājaguru Pandit Hemaraj Śarma, The Chowkhamba publication, Banaras, 1953.

3. *Caraka Samhitā :* "Expounded by the worshipful Ātreya Punarvasu, compiled by the great sage Agniveśa and redacted by Carka and Dṛḍhabala with the *Āyurveda dīpikā* commentary of Cakrapāṇidatta, edited by Vaidya Yādavajī Trikamjī Ācārya, Nirṇaya Sāgar Press-Bombay publication, 1941.
4. *Caraka Samhitā* with *Nirantarapada Vyākhyā* : commentary of Jejjaṭa, edited by *Āyurvedācārya* Pt. Haridatta Śāstri, Chowkhamba publication, Banaras, 1940.
5. *Caraka Samhitā :* Edited and published in six volumes by Śree Gulabkunverba Āyurvedic Society, Jamnagar publication, 1949.
6. *Caraka Samhitā* with *Jalpakalpataru Ṭīkā* by *Mahāmahopādhyāya* Sri Gaṅgādhar Śāstrī, Kolutola Street : 27, Calcutta, Publication 1949 Śaka.
7. *Caraka Samhitā* with *Carakopaskāra Ṭīkā* by *Mahāmahopādhyāya Kavirāja* Yogendra Nāth Sen M.A.
8. *Suśruta Samhitā* with *Ḍalhaṇa's* commentary—*Nibandha Samgraha*—and Gayadāsa's commentary—*Nyāya Candrikā* and *Pañjika*, together with Cakradatta's *Bhānumati Vyākhyāna :* Nirṇaya Sāgar press, Edition 1938.
9. *Suśruta Samhitā :* English translation by Kavirāja Kunja Lal Bhiṣagratna. Calcutta 1907.
10. *Aṣṭāṅga Samgraha* with Indu's commentary in 3 volumes. Mangalodaya Company, Trichur, Kerala, Edition 1913.
11. *Aṣṭāṅga Hṛdaya* with *Sarvāṅga Sundari Ṭīkā* of Aruṇdatta and *Āyurveda Rasāyana Ṭīka* by Hemādri : Nirṇaya Sāgar Press Publications, 1937. Bombay.
12. *Śārṅgadhara Samhitā* with Aḍhamalla's *Dīpikā* and Kaśīrāma's *Gūḍhārtha Dīpikā* commentaries, Nirṇaya Sāgar Press. edition 1931.
13. *Bhāva Prakāśa :* Chowkhamba publication, Banaras, 1956.
14. *Āyurvedasūtram* with commentary of Yogānandanātha, edited by Dr. Śāma Śāstri, Mysore University Publication, 1922.
15. *Hṛdaya Priyā* of Parameśvara, Trivandrum (Kerala) Sanskrit series No. XXIII edited by K. Sambaśiva Śhastri.
16. *Yogaratna Samuccaya* (Part I), Śri Citra Ayurveda Series No. V, edited by C. N. Narayana Moose, under the auspices of Government of Travancore (Kerala).
17. *Dhārā Kalpa :* edited by Nīlkanṭha Śarma of Kerala and Yādavaji, Bombay Publication, 1933.
18. Fundamental principles of Ayurvedic Medicine : Government of Madras publication.
19. Principles of Ayurvedic Treatment by Dr. A. Laxmipathi, Madras.
20. Āyurvedic Treatment of Kerala by *Aṣṭavaidyan Vayaskar* N. S. Mose, Vaidya Sārathy, Kottayam Publication, 1946.
21. *Pañcakarma or Śodhana Cikitsā* (in Malayalam language) by Shri Keśavan Vaidyan, Shertalam, Kerala Publication, 1946 (1124 M.E.)

It has to be mentioned here that the available editions of *Bhela and Kāśyapa Samhitās* are much mutilated and efforts have been made by the editors to fill up the several gaps left in them. Non-the-less, there are several places where the gaps still remain to be filled up.

As regards the *Caraka Samhitā,* it is seen that the available edition is the one redacted by *Dṛḍhabala.*[1] Even so, the existing edition of *Suśruta Samhitā* is alleged to have been redacted by a Nāgārjuna.

Vāgbhaṭa's *Aṣṭāṅga Samgraha* and *Hṛdaya,* according to authorities entitled to opinion, belong to the "Early seventh century of the Christian era or about 625 A.D.[2]. The importance of these works as regards the subject of this thesis, arises from the fact that they are stated to have been written by Vāgbhaṭa in Kerala[3] (Malabar) and the *Pañcakarma Cikitsā paddhati* is stated to have been developed by his eight disciples—the well known *Aṣṭavaidyans of* Kerala whose descendents, even today, are known by this title, are held to be authorities on this therapy.

There is evidence that literature belonging to post-Vāgbhaṭa period has largely drawn upon Vāgbhaṭa's *Samgraha* and *Hṛdaya,* among other ancient Ayurvedic Medical classics.

Śārṅgadhara Samhitā, Bhāva Prakāśa and *Āyurveda Sūtra, Hṛdaya Priyā, Yogaratna Samuccaya, Dhārā Kalpa* etc. which belong to post-Vāgbhaṭa period, have also dealt with Pañcakarma therapy in general, based obviously, on earlier Ayurvedic classics.

The modern Ayurvedic lietrature dealing with *Pañcakarma* therapy and Ayurvedic treatment of Kerala are also important as these works deal with the practice of this therapy, as is now in vogue, in Kerala.

SECTION III

APPROACH TO THE SUBJECT

The author has made two approaches to the subject under reference viz., (a) the study of the theories basic to the *Pañcakarma* therapy and the several measures included under it available in ancient Ayurvedic literature having regard to the more recent researches in allied fields of physiology, including biochemistry, and pathology and

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[1] "Dṛḍhabala can be placed, somewhere between the end of the 3rd century and beginning of the 4th century. (Caraka Samhitā vol. 1, p. 101. Jamnagar edition).

[2] C. Dwarakanath : Fundamental Principles of Ayurveda, Part III, Introductry, p. 1.

[3] It is also claimed that there were two *Vāgbhaṭas* viz., senior and junior. *Aṣṭāṅga Samgraha* is stated to have been compiled by senior *Vāgbhaṭa,* while *Aṣṭāṅga Hṛdaya* by the junior. A large number of scholars belonging to Kerala, however hold the view that there was only one *Vāgbhaṭa* who compiled both the works. It has been stated that *Vāgbhaṭa* originally belonged to *Sind* and later, migrated and settled down in *Kerala* (*Malabar*) where he is said to have compiled his work. (C. Dwarakanath : Fundamental Principles of Ayurveda, Introductory p. 1.)

(b) the study, in special, of *Pūrvakarma* (*sneha* and *sveda*), *Pradhāna karma* (*vamana* and *virecana*) and *Paśćāt karma* (*samsarjana krama*) as applied in practice in the wards of the hospital attached to the Post Graduate Training Centre in Āyurveda, Jāmnagar. This includes the criteria for proper selection of cases which have indications for the treatment, having regard to various Āyurvedic physiological and pathological criteria.

While, in general, the Āyurvedic mode of approach and explanations have been followed in this study, an attempt has also been made, in keeping with the facilities available for the purpose, to determine and explain the above, in terms of known scientific facts of today. This approach, in the opinion of the author, is important, as it is necessary to make this study as objective as possible, so that the observations made, may be controlled by known methods of science. A bibliography of modern scientific books and journals consulted and referred, in this connection, is furnished in the appendix.

The author believes that the facts, he has been able to present, will be of considerable value to those who are interested in the subject and earnestly hopes that this enquiry will inspire further planned and scientific studies in the Pañcakarma therapy by other workers in the field of medicine.

Chapter Two

THEORIES WHICH ARE COGNATE TO THE STUDY OF PAÑCAKARMA THERAPY

SECTION I

PRELIMINARY CONSIDERATIONS

It is, perhaps, necessary to review the theoretical basis—*Prākṛta* (physiological) and *Vaikṛta* (pathological)—concepts of Āyurveda which are basic to the study of the subject matter of this thesis.

As pointed out, in the foregoing chapter, the *Pañcakarma* therapy has the widest possible application in the treatment of diseases included, not only under *kāyacikitsā*, but also under *śalya-śālākya tantras* and other branches of Āyurveda. Its importance would appear to be fundamental and correlated, very intimately, to the physiological doctrines basic to Āyurveda viz., *doṣa-dhātu mala-siddhānta*. This doctrine and the *Pañcakarma* therapy developed on the basis of it, would appear to be tenable equally in the present as they did in the palmy and progressive days of Āyurveda.

From a close and critical study of these doctrines in the available editions of *samhitā granthas*, an irresistable feeling that these doctrines comprehend the greatest possible advances made in medical science in India, arises in one's mind. It would appear that, with the advance of theory of the science, its laws *became fewer but of greater scope*.

Talking of the validity of the *siddhānta* itself and its applicability to the present day problems (in the midst of the rapid advances which are being made by different branches of modern science), the author is fully agreed with the observation made by James B. Conant in his new famous work, "On Understanding Science—An Historical Approach" that, "We can put it down as one of the principles learned from the history of science that a theory is only overthrown by a better theory, never merely by contradictory facts. Attempts are first made to reconcile the contradictory facts to the existing conceptual scheme by some modification of the concept. Only the combination of a new concept with the facts contradictory to the old ideas, finally brings scientific revolution. And, once this has taken place, then, in a few short years discovery follows after discovery and the branch of the science in question progresses in leaps and bounds".[1]

Doṣa-dhātu-mala siddhānta is indeed old. It has been the basis for the practice of medicine in India for over two thousand years and it was a contemporary of the Greek, Egyptian, Chinese, Arabian and other systems of medicine, during this period. It had influenced the growth of these medical systems and was influenced, in its turn, by them. It continues, even today, as a contemporary of modern medicine and researches in which latter, is rapidly developing. Naturally, therefore, one may take the view that this *siddhānta* represents 'old ideas' and 'an existing conceptual scheme', which describes life process and living states and which, in a sense, has offered a complete theory of the functioning of the living man. Modern developments in the field of biology and medicine have yet to offer a conceptual scheme of the whole living man and processes which occur in him. Contributions flowing from its innumerable specialised fields of study have yet to be integrated together as a composite whole, so as to lead to broad-based generalisations and the formulation of principles.

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[1] James B. Conant "On Understanding Science" : Mentor publication, 1951 edition, p. 48.

In a sense, the Āyurvedic 'conceptual scheme' of man would appear to be fundamental and it conforms to the category known as *sāmānya*, whereas, modern developments in different fields of biology and medicine would appear to belong to the category known as *viśeṣa*.

Therefore, apparant difference between the *Doṣa-Dhātu-Mala siddhānta* on the one hand and modern contributions in the field of biology and medicine on the other, are not fundamentally different. The former theory cannot be overthrown on the ground of some contradictory facts flowing from specialised fields of investigations in the field of modern biology and medicine. Contradictory facts, if any, may be utilized, where found necessary, to reconcile the existing conceptual scheme by effecting slight modifications where found necessary.

It is obvious that sooner or later, rather sooner than later, these *viśeṣas* may have to be painted in appropriate places on the canvas of *sāmānya*, which may, in the fullness of time, provide an enlarged and up-to-date theory of man in his different aspects viz., physical (including chemical) and biological (including psychological and spritual).

SECTION II

THE CONCEPT OF *DOṢA-DHĀTU-MALA*

It is well known that the physiological and pathological doctrines of Āyurveda are based on the concept of *doṣas, dhātus, and malas*. These factors are held to be the *sine qua non* of life and its processes. The importance attached to them can be seen from the citations below, extracted from the *saṃhitās* of Suśruta, Caraka and Vāgbhaṭa.

Says Suśruta[1] "The three *doṣas*, *dhātus*,

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[1] त्रयो दोषा धातवश्च पुरीषं मूत्रमेव च ।
देहं संधारयन्त्येते ह्यव्यापन्ना रसैर्हितैः ॥
(Suśruta ; Uttara : *66*, 6)

and also × × त्रयो दोषा वातादयः, धातवः सप्तरसादयः । अव्यापन्ना अविकृतिं गताः । रसैर्हितैरिति मधुरादिरसैः पथ्यैरित्यर्थः ।
and also (Dalhaṇa on above)

purīṣa,[1] *mūtra* etc., in their normal states, with *āhāra-rasa*, hold together the corporeal body".

"The *doṣas, dhātus* and *malas* constitute the basis of the living body".[2]

"*Vāyu pitta, śleṣmā* are to be considered as primary and essential contributory factors responsible for the occurance of the human body. They maintain the integrity of the body and lend support to it very much like the three stays (*tristhūṇa*) support a dwelling house. The impairment of the equilibrium of these factors may lead to the dissolution of the body or to death, while on the normal state of their equilibrium, depends its well being. The *doṣas* together, with the fourth factor the *ṣoṇita* (*rakta*) determine the origin, preservation and dissolution of the living being, which latter, they permeate with their respective qualities till the time of death".[3]

"No living being is without *vāyu, pitta, kapha* and *rakta*. These are ever necessary for the maintenance of its integrity".[4]

"These *doṣas* contribute to the integrity of the organism by creating, assimilating and diffusing strength in the same way as *soma, sūrya, anila* maintain the integrity of the terrestrial world".[5]

According to Caraka, "*Doṣas* are three viz. *vāta, pitta* and *kapha*. In their normal equilibrial states they control the proper functioning of the body. In their abnormal states they inexorably afflict the body by causing various kinds of diseases".[6]

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[1] The term *purīṣa* and *mūtra* are, generally, translated as faeces and urine respectively. But the implication of these terms appears to be comprehensive as could be seen from their root meaning furnished by *Bhānujī Dīkṣit,* in his commentary on *Amarkoṣa*: It includes, among others, (*a*) पिपर्ति शरीरम् । पृ पालनपूरणयोः (जु० प० स०) i.e., to *rule*, to manitain, to sustain, and to bring up and to fill or to store up and (*b*) उच्चार्यते त्यज्यते चर गतौ (भ्वा० प० से०) i.e., to go out or the act of being expelled. It would be seen from these that, the term *purīṣa*, has two significant aspects viz., (i) an aspect which supports and sustains the body and, (ii) an aspect which relates to factors meant to be eliminated from the body. The term, *mūtra*, refers, to the fluid which specially flows out i.e., मूत्र्यते मूत्रं प्रस्रवणे (चु०उ०से०) Hence, these terms would refer, in general, to the products which arise during the course of digestive and metabolic events, some of which are periodically eliminated from the body.

[2] दोषधातुमलमूलं हि शरीरम् × × ।
(Suśruta : Sūtra : *15* ; 3)

[3] वातपित्तश्लेष्माण एवं देहसंभवहेतवः । तैरेवाऽव्यापन्नैरधोमध्योर्ध्वसन्निविष्टैः शरीरमिदं धार्यतेऽगारमिव स्थूणाभिस्तिसृभिरतश्च त्रिस्थूणमाहुरेके । त एव च व्यापन्नाः प्रलयहेतवः । तदेभिरेव शोणितचतुर्थैः सम्भवस्थितिप्रलयेष्वप्यविरहितं शरीरं भवति ।
(Suśruta : Sūtra : *21*; 3)

[4] नर्ते देहः कफादस्ति न पित्तान्न च मारुतात् ।
शोणितादपि वा नित्यं देह एतैस्तु धार्यते ॥
(Suśhruta ; Sūtra : *21*; 4)

[5] विसर्गादानविक्षेपैः सोमसूर्यानिला यथा ।
धारयन्ति जगद्देहं कफपित्तानिलास्तथा ॥
(Suśruta ; Sūtra : *21*; 8)

[6] दोषाः पुनस्त्रयो वातपित्तश्लेष्माणः । ते प्रकृतिभूताः शरीरोपकारका भवन्ति, विकृतिमापन्नास्तु खलु नानाविधैर्विकारैः शरीरमुपतापयन्ति ।
(Caraka : Vimāna : *1*; 5)

"*Vāta, Pitta and kapha,* in their normal states (of functioning), so combine as to make the man a complete being with his *indriyas.* possessed of strength, good complexion and ease, he is assured of great longevity, even as the triad, *dharma, artha, kāma,* when properly coordinated confer upon him the greatest good—both here and in the hereafter. When disturbed, these three factors cause great tribulation to man, just as the three seasons, when abnormal, inflict evil on world, as at the time of its dissolution".[1]

"*Vāta Pitta kapha* which move throughout the body, produce good and bad effects on the entire system according as they are normal or abnormal".[2]

Says Vāgbhaṭa, "Briefly stated, *vāyu, pitta* and *kapha* are the *tridoṣas.* While in their abnormal states, they contribute to the destruction of the body, they promote and maintain the welfare of the body in their normal states of functioning".[3]

"The *doṣas, dhātus* and *malas* are always the root causes and the basis of the body"[4]

The *samhitā granthas* are replete with references of the type mentioned above. The few cited above are meant merely to emphasise the view that, according to Āyurveda, the processes of health and ill-health revolve round the integrity or otherwise of the *doṣa-dhātu-mala* mechanism.

From a careful study of the main Āyurvedic classics, it is seen that the *guṇas* (physical qualities and characteristics) and *karmas* (actions or functions) of *doṣas, dhātus* and *malas* have been briefly described. Since, according to Āyurvedic view, the normal and abnormal states of the functioning of the living body have to be interpreted in terms of the normalcy or otherwise of these threefold factors of life, it will be relevant to examine their implications. For, the *Pañcakarma* therapy, in its different aspects, is meant to correct their abnormal states and restore the normalcy of their functions and structures to which, these functions may relate.

Dosa :

At the outset, the term *doṣa* needs an explanation. *Vāta, pitta,* and *kapha* are known as *doṣas* because they are stated to be in a state of unstable equilibrium, i.e., this equilibrium is susceptible to imbalance. In addition, they are also stated to be capable of vitiating the integrity of the *dhātus.*[5]

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[1] सर्व एवं खलु वातपितश्लेष्माणः प्रकृतिभूताः पुरुषमव्यापन्नेन्द्रियं बलवर्णसुखोपपन्नमायुषा महतोपपादयन्ति, सम्यगेवाचरिता धर्मार्थकामा इव निःश्रेयसेन महता पुरुषमिह चामुष्मिश्च लोके, विकृतास्त्वेनं महता विपर्ययेणोपपादयन्ति, ऋतवस्त्रय इव विकृतिमापन्ना लोकमशुभेनोपघातकाल इति ।
(Caraka : Sūtra : *12*; 13)

[2] सर्वशरीरचरास्तु वातपित्तश्लेष्माणः सर्वस्मिञ्छरीरे कुपिताकुपिताः शुभाशुभानि कुर्वन्ति ।
(Caraka : Sūtra : *20*; 9)

[3] विकृताऽविकृता देहं घ्नन्ति ते वर्तयन्ति च ।
(Aṣ. Hṛ. Sūtra : *1*; 6)

[4] दोषधातुमला मूलं सदा देहस्य × × ।
(Aṣ. Hṛ, Sūtra : *11*; 1)

[5] (i) तेषां सर्वेषामेव वातपित्तश्लेष्माणो दुष्टा दूषयितारो भवन्ति दोषस्वभावात् ।
(Caraka : Śārīra : *6*; 18)

(ii) शरीरदूषणात् दोषाः ।
(Śārṅgadhara : Pu. *5*; 24)

(iii) दुष्यन्त्यत्र । 'दुष वैकृत्ये' (दि० प० अ०)
(Bhattoji on Amarkoṣa : *3* : 4 : 6)

The term *doṣa* has acquired greater and more frequent usage because of reasons mentioned above, albiet, they are also known as *dhātus* as in their normal states of equilibrium they are responsible for ensuring the efficient functioning of the body, as a whole.[1]

Dhātu :

The purport of the term *dhātu* is significant. It has been defined as "that which supports and nourishes is *dhātu*".[2]

However, the term *dhātu* has special connotation, in general usage, to the sevenfold primary tissue-complexes viz., the *saptadhātus* which comprise the *rasa* (corresponding to the elements of plasma, tissue-fluid and lymph which are inter-related) ; *rakta* (the elements of blood) ; *māmsa* (corresponding to the elements of muscle-tissue in its three-fold forms viz., striated, non-striated and cardiac) ; *medas* (corresponding generally to the elements of adipose-tissue) ; *asthi* (corresponding to the bone and cartilage-tissues which latter is known as *taruṇāsthi*) ; *majjā* (corresponding to the elements of marrow tissue—both yellow and the red) and *śukra* (corresponding to the male reproductive elements). All these, together, are also known as *dūṣyas* as they are succeptible to vitiation.[3] These primary-tissue complexes, especially the elements of *rasa*, *māmsa* and *medas* would appear to enter into the structure of many tissues and organs. In a general sense, substances and structures, spoken of as *upadhātus* may also have to be considered together with the main grouping of the *dhātus* referred to above. *Upadhātus* have been described as structures produced by *dhātus* and which do not undergo transformative changes. In addition, they do not, like *dhātus*, nourish the body, but support it.[4]

Mala :

Likewise, waste-products occur in the body in the course of its vital activities which involve the utilization of nutrition for energy-metabolism on the one hand and synthesis and maintenance metabolism, on the other—

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[1] (i) अतश्च दोषाः देहस्य स्थिरीकरणात् स्थूणा
इत्युच्यन्ते, धारणात् धातवः, मलिनीकरणात्
आहारमलत्वाच्च मलाः, दूषणस्वभावात्
दोषा इति ।
(Aṣ. Sam. ; Sūtra : *20*; 3)

(ii) उक्तं हि 'दोषा अपि धातुशब्दं लभन्ते इति'
(Cakrapāṇi on Suśruta : Sūtra : *14*; 20)

(iii) शरीरदूषणाद्दोषा धातवो देहधारणात् ।
वातपित्तकफाः ज्ञेया मलिनीकरणान्मलाः ॥
(Śārṅgadhara : Pu. *5*; 24)

[2] (i) त एते (रसादयः) शरीरधारणाद्धातव इत्युच्यन्ते ।
(Suśruta : Sūtra : *14*; 20)

(ii) डुधाञ् धारणपोषणयोः
(Bhattoji on Amarkoṣa P. 408)

[3] रसासृङ्मांसमेदोऽस्थिमज्जाशुक्राणि धातवः ।
सप्तदूष्याः × × ।
(Aṣ. Hṛd. Sūtra : *1*; 13)

and also वातादिभिर्दूष्यन्त इति दूष्याः ।
(Aruṇadatta on above)

[4] (i) ते च स्तन्यादयो धात्वन्तरापोषणाच्छरीरपोषका
अप्युपधातुशब्देनोच्यन्ते । × × उक्तं च भोजे
"सिरास्नायुरजः स्तन्यत्वचो गतिविवर्जिताः ।
धातुभ्यश्चोपजायन्ते तस्मात्त उपधातवः ॥ इति
(Cakrapāṇi on Caraka : Cikit. *15*; 17)

(ii) अत्र गतिविवर्जिता इत्यनेन धात्वन्तरपोषणाद्या
गतिर्निषिध्यते ।
(Cakrapāṇi on Suśruta Sūtra : *14*; 20)

(the latter involving repair, replacement and growth)—are designated by the term *mala* in some cases and *kiṭṭa* in others.[1] The former term has been defined as *malas* because they are susceptible to degradation. Some of the *malas* may be eliminated at periodical intervals. These are spoken of as *kiṭṭa* and a part may be utilized to subserve the vital needs of the body, for which reason, they have also been described as *dhātus*.[2] Since, *malas* are also capable of vitiation, they are included, sometimes, under the category of *dūṣyas*.[3]

Similarly, *tridoṣas*, *sapta-dhātus* and *malas* put together, are also described as *malas* in their abnormal states of functioning.[4]

The foregoings represent an over all picture of the three factors (*doṣas, dhātus* and *malas*) stated to be basic to life. As regards their functional and structural identities, it may be necessary to carefully study, firstly, their physical characteristics or qualities (*guṇas*) and functions (*karmas*) described, in the main *samhitā-granthas*; for, the determination of their physical identities has a direct bearing on the treatment as may be planned to restore them to their normal states of functioning.

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[1] (i) तत्राहारप्रसादाख्यो रसः किट्टं च मलाख्य-मभिनिर्वर्तते। किट्टात् स्वेदमूत्रपुरीषवात-पित्तश्लेष्माणः कर्णाक्षिनासिकास्यलोमकूपप्रज-ननमलाः केशश्मश्रुलोमनखादयश्चावयवाः पुष्यन्ति। (Caraka Sūtra : *28*; 4)

(ii) The root किट्ट गतौ (भ्वा. प. से.) means '*to* go out' or 'to be thrown out'. Substances of the body which have a tendency to be separated and eliminated are covered by the term *Kiṭṭa*. The term '*mala*' is generic. It has been defined as मलिनीकरणात् मलाः because it causes मलिन or degradation. In other words, the degradation products of the *dhātus* or body elements are known as *malas*. These products are stated to contribute to the formation of such body-structures as hair, nail, the skin etc.

(iii) It will be of interest to note that degraded (or waste) proteins are, today considered to be used up for structural purposes in animals. Says the well known physicist J.D. Barnal, in his 'Physical Basis of Life' (1951 edition, page 40)

"The first hints at the deciphoring came from the structures of degraded proteins—those used for structural purposes in animals themselves, such as skin, hair and those produced by violent reactions, such as the boiling of the egg."

[2] (i) ते सर्व एव धातवो मलाख्याः प्रसादाख्याश्च। (Caraka : Sūtra : *28*; 4)

(ii) तेषां तु मलप्रसादाख्यानां धातूनां स्रोतांस्ययन-मुखानि। (Caraka Sūtra : (*28*; 5)

[3] मलानाश्रित्य कुपिता भेदशोषप्रदूषणम्।
दोषा मलानां कुर्वन्ति सङ्गोत्सर्गावतीव च॥
(Caraka Sūtra : *28*; 22)

[4] तत्र मलभूतास्ते, ये शरीरस्याबाधकराः स्युः। तद्यथा-शरीरच्छिद्रेषूपदेहाः पृथग्जन्मानो बहिर्मुखाः, परिपक्वाश्च धातवः, प्रकुपिताश्च वातपित्तश्लेष्माणः। ये चान्येऽपि केचिच्छरीरे तिष्ठन्तो भावाः शरीरस्यो-पघातायोपपद्यन्ते, सर्वास्तान्मले सञ्चक्षमहे। (Caraka : Śārīra : *6*; 17)

SECTION III

THE CONCEPT OF *ŚĀRĪRA VĀTA* (*VĀYU*)

Although all the *tridoṣas* are important, they mutually balance one another, strike an equilibrium and maintain a steady state, various kinds of disturbing influences operating on them notwithstanding, still, *vāta* would appear to be the primay motive force without which the other two *doṣas* may cease to be operative.[1] It has been stated that *vāyu* is *yogavāhi* in the sense that, while it induces the other two forces into activity, it also identifies itself with them.[2] Therefore, *vāyu* would appear to play a fundamental role in the dynamics of health or otherwise. It may not therefore, be out of place to consider, in some detail, the concept of *śārīra vāta*.

Vāta is known by several synonyms of which *pavana*, *marut*, *anila*, *samīra* etc. are frequently used. This term is derived from the root *vā* (Suśruta) meaning to move, to enthuse, to become aware of.

According to Suśruta, *vāyu* which possesses the power of locomotion or extreme mobility is endowed with the quality of *rajas* and this quality is the only essential motive force of the universe.[3] In another context he has attributed *praspandanam* (imparting motion to the body), *udvahanam* (conduction of sensory impulses from different *Jñānendriyas* or receptors to their destinations),[4]

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[1] (i) शाखागताः कोष्ठगताश्च रोगा
मर्मोर्ध्वसर्वावयवाङ्गजाश्च ।
ये सन्ति तेषां न हि कश्चिदन्यो
वायोः परं जन्मनि हेतुरस्ति ॥
विण्मूत्रपित्तादिमलाशयानां
विक्षेपसंघातकरः स यस्मात् ।
(Caraka : Siddhi ; *1*; 38-39)

and also वायोः परमिति वायोः परो न कश्चित् श्रेष्ठ इति यावत् । एतेन, यद्यपि कफपित्ते अपि रोगकारणे भवतः, तथाऽपि वायुरेव श्रेष्ठ इत्युच्यते । ………विक्षेपसंघातकर इति वियोगमेलककरः, एतेन यस्माद्वायुरेव दोषमलधातूनां संयोगविभागौ करोति, तेन दोषदूष्यविण्मलमेलकरूपनिखिलव्याधिकरणे वायुरेव प्रधानं भवतीति भावः ।
(Cakrapāṇi on above)

(ii) वातपित्तकफा देहे सर्वश्रोतोऽनुसारिणः ।
वायुरेव हि सूक्ष्मत्वाद्द्वयोस्तत्राप्युदीरणः ॥
कुपितस्तौ समुद्धूय तत्रतत्र क्षिपन् गदान् ॥
(Caraka : Cikit. : *28*,59-60)

(iii) पित्तं पङ्गु कफः पङ्गुः पङ्गवो मलधातवः ।
वायुना यत्र नीयन्ते तत्र गच्छन्ति मेघवत् ॥
पवनस्तेषु बलवान्विभागकरणान्मतः ।
(Śārṅgadhara ; Purva. : *5*; 25-26)

[2] योगवाहः परं वायुः संयोगादुभयार्थकृत् ।
दाहकृत्तेजसा युक्तः शीतकृत् सोमसंश्रयात् ॥
(Caraka Cikit. : *3*; 38)

and also × × योगाद्योगिनो गुणं वहतीति योगवाहः । परमिति अत्यर्थम् ।
(Cakrapāṇi on above.)

[3] × × तेषां वायुर्गतिमत्त्वात् प्रसरणहेतुः सत्यप्यचैतन्ये । स हि रजोभूयिष्ठः, रजश्च प्रवर्तकं सर्वभावानाम् ।
(Sūśruta : Sūtra *21*; 28)

[4] (a) The destination referred to here is the *manas* with its five *indriyabuddhis*.

(b) पञ्चेन्द्रियबुद्धयः—चक्षुर्बुद्ध्यादिकाः, ताः पुनरिन्द्रियेन्द्रियार्थसत्त्वात्मसन्निकर्षजाः, क्षणिका, निश्चयात्मिकाश्च ।
(Caraka : Sūtra : *8*; 12)

pūraṇam (the propulsion of the food into its proper receptacles meaning deglutition and perstalic movements of the stomach and intestines which move foods from one segment of the *koṣṭha* to another), *vivekam* (the separation of *sāra* or nutrient fraction from the *kiṭṭa* or the residue of food-stuffs) and *dhāraṇam* (voluntary actions, such as the retention and evacuation of urine etc.).[1]

The functions ascribed by Caraka to *vāta* are many and they cover almost all vital functions of the living body. They are: "*vāta* is the upholder of both *yantra* and *tantra* (the former term has reference to all the supporting constituents of the body and the latter to the proper circulation, integration and regulation of these factors; manifests itself in five forms viz., *prāṇa, udāna, samāna, vyāna* and *apāna;* it impells every upward and downward motion and serves as the controller and conductor of the *manas* (mind); it is the urger of all the senses and the factor that conducts all the sense impulses; it holds together the various elements of the body in their proper form and maintains the cohesive unity of the body; it brings about speech and is the basis of sound and touch. Even so, it is the basic physical constituent of the organs of hearing and touch; it is the origin of joy and enthusiasm and the stimulator of *agni;* it is also the cause which dries up the *doṣas* and expels *malas* out of the body; it is the cause of the division of all *srotāmsi* of the body—both macroscopic (*sthūla*) and microscopic (*sūkṣma*) and its presence, in the body is the evidence of life".[2]

Bhela adds that "so long as *vāta* lasts, as long does life exist".[3]

Vāgbhaṭa has included under the functions of *vāta*, the following; "zest, expiration and inspiration, motor activities of the body (mental, vocal and physical), the regulation of natural urges and the due circulation (and function) of the sevenfold primary tissue complexes as well as the functions of sensory organs".[4]

A later authority, *Śārṅgadhara*, has pithily summed up the functions of *vāta* in a fine simile thus:—"*Pitta, kapha, dhātus* and *malas*, which are lame (being incapable of independent volition of their own) are kept in motion by *vāta* very much like the wind which propels clouds from place to place".[5]

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[1] तत्र, प्रस्पन्दनोद्वहनपूरणविवेकधारणलक्षणो वायुः पञ्चधा प्रविभक्तः शरीरं धारयति ।
(Sūśruta : Sūtra : *15* ; 3)

[2] वायुस्तन्त्रयन्त्रधरः, प्राणोदानसमानव्यानापानात्मा, प्रवर्तक चेष्टानामुच्चावचानां, नियन्ता प्रणेता च मनसः, सर्वेन्द्रियाणामुद्योजकः, सर्वेन्द्रियार्थानामभिवोढा, सर्वशरीरधातुव्यूहकरः, सन्धानकरः शरीरस्य, प्रवर्तको वाचः, प्रकृतिः स्पर्शशब्दयोः, श्रोत्रस्पर्शनयोर्मूलं, हर्षोत्साहयोर्योनिः, समीरणोऽग्नेः, दोषसंशोषणः, क्षेप्ता बहिर्मलानां, स्थूलाणुस्रोतसां भेत्ता, कर्त्ता गर्भाकृतीनां, आयुषोऽनुवृत्तिप्रत्ययभूतो भवत्यकुपितः ।
(Caraka : Sūtra : *12*;8)

[3] यावत्तिष्ठति वातो हि देहस्तावत्तु जीवति ।
(Bhela Samhitā p. 27)

[4] × × × × तं चलः ।
उत्साहोच्छ्वासनिश्वासचेष्टावेगप्रवर्तनैः ।।
सम्यग्गत्या च धातूनामक्षाणां पाटवेन च ।
अनुगृह्णात्यविकृतः × × × ।।
(Aṣ Hṛd. : Sūtra : *11;* 1-2)

[5] पित्तं पङ्गु कफः पङ्गुः पङ्गवो मलधातवः ।
वायुना यत्र नीयन्ते तत्र गच्छन्ति मेघवत् ।।
(Śārṅgadhara : Pr. *5*;25(

Lastly, in the words of *Haṭhayoga Pradīpikā* "*Manas* (mind) is the lord of the *indriyas* (senses) and *vāyu* is the lord of the *manas*[1] (mind)".

As regards the physical characteristics of *śārīra-vāta*, it is seen that qualities ascribed to it in the *Caraka Samhitā* such as *rūkṣatva*, *laghutva*, *śītatva*, *dāruṇatva*, *kharatva*, *viśadatva*, *sūkṣmatva* and *calatva*,[2] appear to be based on inferential reasoning, as is evident from the recorded summary of the discussion recorded in the *vātakalākalīya adhyāya* of the *sūtrasthāna* of the *Caraka samhitā*. The fact that *vāta* is *asamghāta* or incorporeal (unknowable, being formless) and *anavasthita* (unstable) having been tacitly accepted by all concerned, the question as to how corporeal foods and medicinal substances can come into contact with it, either to excite it or ally its excitation, has been raised.[3]

Kumāraśira Bhāradvāja has sought to explain this paradox by taking his stand on the axiom that repeated indulgence in qualities, substances and potencies homologous to *vāta* cause its excitation.[4] Kaṅkāyana of Bāhlīka is seen to have stated that constant indulgence in qualities, substances and potencies non-homologous to *vāta* bring about the alleviation of the excited vata.[5] Badiśa Dhamārgava is seen to have carried the discussion a step further and stated that the exciting factors of *vāta*, in the human body, are those which cause *rūkṣatva*, *laghutva*, *śītatva*, *dāruṇatva*, *kharatva*, *viśadatva* and *suṣiratva*. On the other hand, substances that promote *snigdhatva*, *gurutva*, *uṣṇatva*, *ślakṣaṇatva* and *picchilatva* in the body, ally the excited *vāta*.[6]

These are significant observations and have far-reaching implications.

The following points emerge from the above : —

(*a*) The description of physical attributes of *śārīra-vāyu* (biological *vāyu*) as opposed to *lokavāyu* (physical *vāyu*) would appear to be based on *anumāna pramāna* (inferential, deductive, inductive and anological reasonings). These reasonings, it is obvious, have relied on facts of observation. Since, in ancient days, there did not appear to have been any objective method for the determination of the nature of *śārīra vāyu* and its qualities except perhaps its known and observed functions, the method of *anumāna* appears to have been the only instrument of knowledge. *Vāyu*, from all accounts one has of it, has been described *anavasthita*[1] (unstable) and *avyakta* (imperceptible), its true nature cannot be known or is not knowable. However, its presence can be recognised by the functions it performs (*vyakta-karma*).[2]

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[1] इन्द्रियाणां मनो नाथो मनोनाथस्तु मारुतः ।
(Haṭhayoga Pradīpikā)

[2] रूक्षलघुशीतदारुणखरविशदाः षडिमे वातगुणा भवन्ति ।
(Caraka : Sūtra : *12* ; 4)

रूक्षः शीतो लघुः सूक्ष्मश्चलोऽथ विशदः खरः ॥
(Caraka : Sūtra ; *1*; 59)

[3] × × कथं चैनमसङ्घातवन्तमनवस्थितमनासाद्य प्रकोपणोपशमनानि प्रकोपयन्ति प्रशमयन्ति वा ।
(Caraka : Sūtra : *12*; 3)

[4] × × स त्वेवं गुणैरेवं द्रव्यैरेवं प्रभावैश्च कर्मभिरभ्यसमानैर्वायुः प्रकोपमापद्यते, समानगुणाभ्यासो हि धातूनां वृद्धिकारणमिति ।
(Caraka : Sūtra : *12*; 5)

[5] × × अतो विपरीतानि वातस्य प्रशमनानि भवन्ति प्रकोपणविपर्ययो हि धातूनां प्रशमकारणमिति ।
(Caraka : Sūtra : *12*; 6)

[6] × × वातप्रकोपणानि खलु रूक्षलघुशीतदारुणखरविशदशुषिरकराणि शरीराणां, तथाविधेषु शरीरेषु वायुराश्रयं गत्वाऽऽप्यायमानः प्रकोपमापद्यते । वातप्रशमनानि पुनः स्निग्धगुरूष्णश्लक्ष्णमृदुपिच्छिलघनकराणि शरीराणां, तथाविधेषु शरीरेषु वायुरसज्यमानश्चरन् प्रशान्तिमापद्यते ।
(Caraka : Sūtra : *12*; 7)

(b) An important observation which appears to have led to the description of its *guṇas* relates to the influence of *āhāras*, *auṣadhas* and *vihāras* on *śārīra vāyu*. Thus, the constant use of *āhāras* and *auṣadhas* possessing *rūkṣādi guṇas*, are stated to lead to abnormal (and/or subnormal) states of functioning of *vāta* whereas, the use of *āhāra* and *auṣadha dravyas* possessing opposite *guṇas* viz. *snigadhādi guṇas*, are stated to bring about not only the alleviation of the signs and symptoms of the *prakopa* of *vāta* but also restore it to its normal states of functioning. By implication, therefore, the recorded results of the two kinds of experiments, mentioned above, would lead to the conclusion that the *ātmaguṇas* of *śārīravāta* must comprise of the former group of qualities viz. *rūkṣhādiguṇas*.

The main principle on which the conclusions in (*a*) and (*b*) above are based is, of course, the application of the postulate '*Sāmānyam vṛddhi kāraṇam*' i.e., *sāmānya* is the cause of an increase of all things at all times and the general combines, for, the element of agreement is the general".[3] The term *sāmānya* used here refers to identity or sameness between concepts and things. True identity is the sameness or oneness of things as they are. *Sāmānya* is stated to be always responsible for an increase of the concerned *bhāvas* (aspects).

The actual application of this postulate in the determination of the physical qualities of *vāta* can be summed up as follows on the lines described by Vāgbhaṭa. He observes "the *sthāna* of *vāta* is *asthi*, those of *pitta* are *rakta* and *sveda*, the remaining *dhatus* viz., *rasa*, *māmsa*, *medas*, *majjā* and *śukra* are the *sthānas* of *śleṣmā*". The relation between *doṣas* and *dhātus*, referred to above, has been described as *āśrayāsrayībhāva*. *Auṣadhas* that engender the *kṣaya* (defecit) or *vṛddhi* (surfeit) as the case may be, of the one, leads to the *kṣaya* or *vṛddhi* of the other. An exception to this rule is *vāyu*, among *doṣas* and, *asthi* among *dhātus*. The inapplicability of the principle to *vāyu* and *asthi* is stated to arise on account of the fact that *vṛddhi* or surfeit is caused by *bṛmhaṇa* therapeutics. By implication, *vṛddhi*, generally, depends on *kapha*. *Kṣaya* of the *doṣas* and *dhātus*, on the other hand, are brought about by *laṅghana* therapeutics and the *doṣa* involved in this case is *vāyu*.

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[1] × × कथं चैनमसङ्घातवन्तमनवस्थितमनासाद्य प्रकोपणप्रशमनानि प्रकोपयन्ति प्रशमयन्ति वा, × × ।

(Caraka : Sūtra : *12;* 3)

[2] × × अव्यक्तो व्यक्तकर्मा च × × ।

Suśruta : Nidāna : *1*; 7)

[3] सर्वदा सर्वभावानां सामान्यं वृद्धिकारणम् ।
× × × × × ॥
सामान्यमेकत्वकरं × × × ।
तुल्यार्थता हि सामान्यं × × ॥

(Caraka : Sūtra : *1*; 44-45)

It would seem by the application of this principle that, the treatment of *asthikṣaya* with *bṛmhaṇa* measures may result in *asthivṛddhi* and *vātakṣaya* and by the same token, the treatment of *vātakṣaya* with *laṅghana* measures may lead on to the *kṣaya* of the *asthidhātu*. *Vāgbhaṭa* has, therefore, drawn pointed attention to the need to keep this principle in mind and directed that, in the case of *vāta*, its *vṛddhi* has to be treated with *bṛmhaṇa* and its *kṣaya* with *laṅghana*.[1]

The foregoing apart, all authorities are agreed that the *tridoṣas*, including *vāta*, as well as the *saptadhātus* and *malas* or, for that matter, the entire body, is the outcome of nutrition i.e., *āhāra*. It will follow from this that, *vāta* is also an outcome of nutrition (*āhāra*) and its normal and abnormal states of functioning are directly determined by nutrition (*āhāra*). There is sufficient basis in authority to warrant the statement that substances which possess *rūkṣādi guṇas* tend to impair the functional states of *vāta*. In the alternative, a deficient intake of substances that possess *snighādi guṇas* may lead to a corresponding deficiency of the *dhātus* which share similar qualities with the result that, there may be a relative increase of *rūkṣādi guṇas* leading to *vātavaiṣamya*.[2]

In addition, from the point of view of therapeutics also, it is seen that the treatment of *vātavṛddhi* should be of the *bṛmhaṇa* type. This comprises mainly of *āhāra* and *auṣadhadravyas* which possess the following *guṇas* or qualities[3]:

Guru, śīta, mṛdu, snigdha, bahala, sthūla, picchila, manda, sthira and *ślakṣṇa*. In the reverse direction, *vātakṣaya* is to be treated with *laṅghana* therapy. This therapy consists of the administration of substances which possess the following *guṇas* or qualities: *laghu, uṣṇa, viśada, sūkṣma, khara, sāra* and *kaṭhina*.[4]

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[1] तत्रास्थनि स्थितो वायुः पित्तं तु स्वेदरक्तयोः ।
श्लेष्मा शेषेषु तेनैषामाश्रयाश्रयिणां मिथः ॥
यदेकस्य तदन्यस्य वर्धनक्षपणौषधम् ।
अस्थिमारुतयोर्नैवं प्रायो वृद्धिर्हि तर्पणात् ॥
श्लेष्मणाऽनुगता तस्मात् सङ्क्षयस्तद्विपर्ययात् ।
वायुनाऽनुगतो अस्माच्च वृद्धिक्षयसमुद्भवान् ॥
विकारान् साधयेच्छीघ्रं क्रमाल्लंघनबृह्मणैः ।
वायोरन्यत्र तज्जांस्तु तैरेवोत्क्रमयोजितैः ॥
(Aṣ. Hṛd. : Sūtra : *11*; 26-29)

[2] (i) तत्राहारप्रसादाख्यो रसः किट्टं च मलाख्यमभिनिर्वर्तते । किट्टात्स्वेदमूत्रपुरीषवातपित्तश्लेष्माणः कर्णाक्षिनासिकास्यलोमकूपप्रजननमलाः केशश्मश्रुलोमनखादयश्चावयवाः पुष्यन्ति ॥ पुष्यन्ति त्वाहाररसात् रसरुधिरमांसमेदोऽस्थिमज्जाशुक्रौजांसि पञ्चेन्द्रियद्रव्याणि धातुप्रसादसंज्ञकानि शरीरसन्धिबन्धपिच्छादयश्चावयवाः ।
(Caraka : Sūtra : *28*; 4)

(ii) × × × देहो ह्याहारसम्भवः ।
(Ibid : .... ; 41)

[3] गुरु शीतं मृदु स्निग्धं बहलं स्थूलपिच्छिलम् ।
प्रायो मन्दं स्थिरं श्लक्ष्णं द्रव्यं वृंहणमुच्यते ॥
(Caraka : Sūtra : *22* ; 13)

[4] लघूष्णतीक्ष्णविशदं रूक्षं सूक्ष्मं खरं सरम् ।
कठिनं चैव यद्द्रव्यं प्रायस्तल्लङ्घनं स्मृतम् ॥
(Caraka : Sūtra : *22* ; 12)

It may further be noted that, even the *śodhana* measures prescribed for *vātadoṣa* consists of mild type of *śodhana karma* comprising *sneha* and *sveda* and the employment, therefore, of substances possessing *madhura*, among *rasas*, and *sneha basti* and varieties of *sneha* substances.[1]

This would, in effect, mean that normal states of the functioning of *vāta* are influenced, within limits, by *snigdhādi guṇas* and not by opposite qualities which later would appear to be associated with abnormal states of functioning of *śārīravāta*.

The question will now arise if qualities associated with normal states of functioning of *vāta* or, in the alternative, those that are associated with its abnormal states of functioning, can be stated to be the *ātmaguṇa* of *vāta*? It would, be more appropriate to ascribe to *vāta* the *guṇas* of substances that are associated with its normal functioning and not otherwise. Notwithstanding the fact brought out in the foregoing discussion, a justification for ascribing ponderable and tangible qualities to a factor which has been described, advisedly, as intangible and imponderable—*asaṅghata, amūrta, anavasthita* and *avyakta*—would appear to need an apprisal. The need for such an apprisal arises out of the unmistakable description of *śārīravāta* as "*avyakto-vyakta karma ca*".[2] The observation made by the scientist philospher Bertrand Russel, as regards the nature of electricity, will apply to any attempt to describe the physical qualities of *śārīravāta*. Says Sir Bertrand: 'Electricity is not like St. Paul's Cathedral. It is the way in which things behave. When we have told how things behave when they are electrified and under what circumstances they are electrified, we have told all there is to tell".[3]

However, a more fruitful line of enquiry as to the substance present in and the structures of the body through which the phenomenon of *śāriva vāta* manifests may, possibly throw some light on the *ātmaguṇas* ascribed to *vāta*. This method, in the words of the great physician philospher Einstein, is "To raise new questions, new possibilities, to regard old problems from a new angle".[4] It is exactly this approach which the author proposes to make for an elucidation of this old, albeit, important problem of *vāta*. This problem is admittedly important in view of the proven and established value and utility of *pañcakarma* therapeutics, especially, of the *snehana, svedana* and allied measures described in *Āyurveda*, not only in the treatment of disorders involving *śārīravāyu* but also of the remaining two *doṣas*. The significance of this approach will become emphasised in view of the *guṇas* ascribed to *śārīravāyu* and the employment of *sneha, sveda* and *basti karmas* for the restoration of its normal states of functioning.

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[1] स्नेहस्वेदौ विधियुक्तौ, मृदूनि च संशोधनानि स्नेहोष्णमधुराम्ललवणयुक्तानि, तद्वदभ्यवहार्याणि, अभ्यङ्ग × × × अवगाहन × × × स्नेहाश्चानेकयोनयो × × शतपाका: सहस्रपाका: सर्वशश्च प्रयोगार्था:, बस्तय:, बस्तिनियम:, सुखशीलता चेति ।

(Caraka : Vimāna : *6* ; 16)

[2] अव्यक्तो व्यक्तकर्मा च × × × ।

(Suśruta ; Nidāna : 1 ; 7)

[3] Quoted by Lincon Barnet in 'The Universe and Dr. Einstein ; p. 17 ; Mentor Publication : III Edition.

[4] Einstein : "The Evolution of Physics" : p. 95. Cambridge University Publication.

An enquiry about the identity of *dravyas* (substances) to which *snigdhādi guṇas* minus *śīta* plus *uṣṇa* which are stated to bring about the *śamana* and *prakṛti samsthāpana* of *vāta doṣa*, as contrasted with *rūkṣādi guṇas* (minus *uṣṇa* plus *śīta*) that bring about the *vaiṣamya* of this *doṣa* may be greatly facilitated by a proper indentification of structures and substances in the body through which this *doṣa* manifests and functions. A careful and critical study of the description of the functions of *śārīra vāyu* found in the available editions of the *samhitāgranthas*, already described elsewhere, shows that many of the physical and mental phenomena ascribed by modern physiologists, primarily, to the activities of the nervous system in its different aspects — the central and the peripheral (including the autonomous, vegetative etc.) — generally parallel the functions of *vāta*. This view finds support in the valuable contributions made, in modern times, by many eminent and top-ranking authorities on *Āyurveda*, a few of which are extracted here-under: Late Mahāmahopādhyāya Kavirāja Gaṇanāth Sen has, in his *Pratyakṣa Śārīra,* described the functions of five *vātas* in terms of those of the different aspects of the nervous system.[1] Vaidyaratna Captain G. Śrīnivāsa Mūrti, discussing the physical constitution and functions—somatic and psychic — of *śarīravāya* has advanced the view that, "Many of these physical phenomena attributed to *vāta* are included among those which western physiologists would assign, primarily, to the activities of nervous system (both cerebro-spinal and autonomic).[2] Kavirāj Dhirendra Nāth Ray has stated that "Most of the functions of five *vāyus* are those of the modern nerves".[3] In the conclusions arrived at by the Scientific Memoranda Sub-committee (Poona 1947) of the Chopra committee on indigenous systems of medicine (1946-48) presented in the form of a "Charter of Agreements", it has been stated that "*Vāyu* acts through the nervous system (central, peripheral and autonomic)".[4]

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[1] Gaṇanātha Sen: Pratyakṣa Śārīram: Part III p.p 166-168.

[2] Special Memorandum on "The Science and the Art of Indian Medicine" by Vaidyaratna Captain G. Śrīnivās Mūrti", Report of the Committee on Indigenous Systems of Medicine (Chopra Committee-1946-48) Vol. II page 347.

[3] Kavirāj D. N. Ray: "The Principles of Tridoṣa and Āyurveda" p. 74.

[4] These and other conclusions were unanimously agreed to by the learned delegates of the conference of vaidyas, doctors and scientists, convened by the Scientific Memoranda Sub-committee of the Govt. of India Committee on Indigenous Systems of Medicine (Chopra)—Poona—Dec. 1947. Eminent authorities who have subscribed to the charter of agreement, as regards the conclusions reached by the conference are the following :–

(Kavirāj Upendra Nāth Dās Delhi., (Ex Chairman, Scientific Advisory Council of the Central Institute of Research in Indigenous System of Medicine and Post Graduate Training Centre in Āyurveda, Jamnagar), (ii) Vaidya Puruṣottam Śāstrī Hirlekar, Amraoti (iii) Vaidya Gaṇeś Datta Sārasvata (Ex Senior Physician, Late Dr. B. A. Pathak, the then Principal Āyurvedic College, Hindu University, Banaras, has stated that, "All the functions of the cerebro-spinal, as well as the autonomic nervous systems, as we understand them at present, were taken together and put under five different groups. They were five types of *vāyus*".[1]

Without going into the complicated nature of the structure of the nervous tissue, we may take into consideration the composition of the brain in its different parts which may throw considerable light on the *guṇas* or qualities referrable to substances which have a direct bearing on the manifestation and normal functions of *śārīra vāyu*, interpreted as the nerve force. It may, at the outset, be noted that the nervous tissue is highly specialized, both in function and composition. The composition of the brain and nerve relates to the large amount of lipid (fat-like) material relative to protein present in brain solids. It has been shown that the brain contains more lipids as compared to any other tissue in the body.

Tables[2] I, II, and III presented below, furnish details as regards the approximate value for the constituents of the whole and mixed adult brain.

Table I

Approximate Composition of Fresh Adult Brain in %*

Substance	Percent %
Water	77
Solids	23
Total lipids	12—15
Cholesterol	3.6—4.8
Phospholipids	5.7—6.8
Glyco-lipids (Cerebrosides)	1.3—2.6
Sulfolipids (Sulfatedes)	0.66—1.8
Proteins (Neuro-proteins)	8.0—9.0
Glycogen (Dog brain)	0.08—0.13
Organic extractives	1.1—2.0
Inorganic extractives	1.0
Ash	1.5

*After West and Todd, Text Book of Biochemistry, pp. 394-395., 1955 edition

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Central Institute of Research Indigenious System of Medicine, Jamnagar). (iv) Vaidya D. A. Kulkarṇi, Banaras (Ex Deputy-director of Āyurveda Medical & Health Services, U. P.). (v) Dr. C. Dwārakānāth, Bangalore (Ex Professor of Kāyacikitsā, Post Graduate Training Centre in Āyurveda, Jamnagar).
(vi) Vaidya Pañcānan Gaṅgādhar Śastrī Gune, Ahmednagar. (vii) Vaidya Jādvaji Tricumjee Ācārya—Bombay. (viii) Vaidya Jogendra Nāth, Darśan Śāstrī, Calcutta. (ix) Vaidya Jyotiṣ Candra Sarasvati, Delhi. (x) Paṇdit Badrīnāth, Banaras. (xi) Vaidya Rajeśvara Datta Śāstrī, Banaras. (Ex Principal Āyurvedic College, Banaras Hindu University). (xii) Vaidya B. V. Gokhale, Poona. (Ex Principal, Post Graduate Training Centre in Āyurveda, Jamnagar). (*The Report of Committee on Indigenous System of Medicine-Chopra Committee – Vol. 11. p. 191*).

[1] Dr. B.A. Pathak: Scientific Memorandum; Report of Chopra Committee. Vol. II p. 216.

[2] Tables Nos. 47,48,49: West and Todd. "Text Book of Biochemistry" p. 394, 395—Macmillan (New York) publication. 1955 edition.

Table II

Approximate Composition of Gray Matter of the Cortex and White Matter of the Corpus Callosum, in Percent*

Substance	Gray matter	White matter
Water	85	70
Solids	15	30
Total lipids	2.5	20
Cholesterol	1.2	5
Glycolipids	0.4	5.4
Phospholipids	0.8	9.4
Protein	7.5	8.5
Extractives	3.0	1.0

Table III

Composition of the Solids of Human Brain in Percent of Dry Matter**

Substance	Whole Brain (Child)	Whole Brain (Adult)
Phospholipids	24.2	27.3
Glycolipids	6.9	13.6
Cholesterol	1.8	10.9
Liquid Sulfur	0.1	0.3
Protein	46.6	37.1
Extractives	12.0	6.7
Ash	8.3	4.2

* and ** Ibid

It will be seen from the tables above that the brain which consists of neurones and their processes is rich in protein and lipids, the latter being relatively more in quantity than the former. The lipids are linked together with protein and, hence, they are generally known as lipo-proteins. As between the gray matter and white matter, the former seems to contain less of lipids than the latter but the gray matter ranks high as a lipid containing organ. The difference between the gray matter and the white matter, as regards the preponderence of lipids in the latter as compared to the former, is attributed to the presence of a large number of myelinated fibres in the white matter. "Myelin is specially rich in cerebrosides, sphingomyelin and free cholestrol—these substances have been termed myelin-lipids".[1] If the physical characteristics and qualities of the nerve protein, specially, the nucleo-proteins and lipids, are to be described in Āyurvedic phraseology, then, they are basically *snigdha*, *sneha*, *madhura*, *guru*, *manda*, *ślakṣṇa*, *picchila* and *sāndra*.

Dixon *et al* have stated that "The much of ketabolic activities of the neurone is located in their fine dendridic branches and that, during nervous action they are continuously consuming glucose and protein".[1]

Discussing the flow of axoplasm, Dixon *et al* have quoted Weiss and co-workers (1948) as having shown that "......axoplasm is continuously moving from cell body, along the axon, to the periphery. This flow may replace the protein which is expended peripherally to provide energy for pumping out sodium ions during activity.... Excessive activity and anoxia both cause loss of R. N. A. (Ribo Nucleic Acid) from the Nissl-substance. In anoxia, this loss of R. N. A. may also be associated with hyperactivity". According to (a) Einarison (1949) and (b) Krough, (1950), "A similar change in neuronal cytoplasm, involving increased accessibility of the enzymes and the acceleration of all ketabolic processes, including destruction of R. N. A. may accompany the depolarization of normal activity".[1]

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[1] Dixon *et al* 'Cytochemistry of Central Gray Matter. Quarterly Journal of Experimental Physiology and Cognate Medical Sciences p. 138, vol. 39.

It may be added that, the neurones are rich in nucleoproteins which are proteins to which nucleic acids are bound. The protein fraction of nucleic acid is seen to be represented, mainly, by histamines and protamines. The former is stated to occur both in cytoplasm and nucleus, whereas, the latter is found in the nucleus only.

Two kinds of nucleic acids have been recognised viz., Ribonucleic acid (R.N.A.) and Desoxy Ribo Nucleic acid (D.N.A.). Nucleic acids are shown to be built up from much smaller units viz., purine and pyramidine bases, a sugar component and phosphoric acid molecules. The sugars of the nucleic acid are (i) De-Ribose and (ii) Desoxy-D Ribose. It may be noted that Desoxy Ribonucleic proteins are highly viscous substances. Judged from viscosity characteristics, the nucleo-proteins are considered to possess high molecular weight. It would seem from the foregoing references from recent developments in neuro-physiology that, substances which possess *snigdhādi guṇas* enter into the composition of the nerve fibre through which nerve force manifests.

Thus, while great deal is known and can be said about the physical and chemical nature of substances through which the phenomenon of *śārīra-vāta* manifests, little if anything, can be said of the actual *svarūpa* of this force itself, except, possibly the functions it performs, in keeping with the observations of the *ācāryas* that *śārīravāta* is *asaṅghāta, anavasthita amūrta, avyakta* and *vyaktakarmā*". This is like saying "when a nerve is stimulated the change produced in it is known as nerve impulse and the production of the change is evident from the effect which follows e.g., sensation, secretion, movements but the nature of change produced in it or on the nerve itself is unknown.[2]

Paul B. Weisz, Associate Professor of Biology Brown University (U.S.A.) has observed, in his well known book Biology that, "we frankly do not know what a nerve impulse really is. We do know that it is a metabolic living event, a chemical reaction sequence propagated along a nerve".[3]

The foregoing discussion is meant to draw attention to the fact that the *vāta* phenomenon, like its modern analogue, the nerve phenomenon, depends on the structural integrity and metabolism of the material medium through which it manifests and works. Any alteration or change in the status of the medium would affect the manifestation of *śārīravāyu*, as can be judged only from effects that may follow in the wake of such changes. They may involve either *kṣaya* or *vṛddhi* as the case may be, of the constituent elements that compose the medium.

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[1] Dixon *et al*, Cytochemistry of Central Grey Matter. Quarterly Journal of Experimental Physiology and Cognate Medical Science pp. 145-147 Vol. 39.

[2] Mc. Dowall. Hand Book of Physiology and Biochemistry p. 62-63 (1948 edition).

[3] Paul B. Weisz. Biology; p. 445, 1954 edition, Mc. Graw Hill Publication: New York.

The above may be illustrated with the two kinds of *prakopas* of *vāyu* described by *Caraka* and *Vāgbhaṭa* viz., (i) the excitement of *vāyu* brought about by indulgence in causes and substances which lead to *dhātukṣaya*. In this condition, *vāyu* is stated to move through *srotases* which are depleted of their contents and filling them up, attains strength or becomes powerful, or (ii) if the *srotāmsi*, referred to, in number one above, are filled with other *doṣas*, *vāyu* may also enter such *srotāmsi* and being obstructed there, attain strength and becomes powerful".[1]

The former condition is suggestive of changes that take place in the structure of the nerve leading to its degeneration due to mal— or impaired nutrition and the consequent changes that occur in its chemical structure and the depletion of its lipid and nucleoprotein content. The latter condition is, on the other hand, suggestive of obstruction to the passage of the nerve impulse on account, among other factors, of infections, vascular accidents, tumours, degeneration of nerve tracts or the state of the neuro-muscular junction.

Even so, changes in the metabolism of the brain which has a high lipid content, has been shown to coincide with changes in the concentration of blood lipids. Although, the results reported, so far, in this regard, have not been very consistent yet, most contributions made till now appear to indicate the existence of hypolipemia in the schizophrenic.[2]

Bodansky, has made a reference to Heuyer's findings viz., "Patients in depressive states had low blood cholesterol, while those in excitement showed increase". He has referred to Berger and Schubina, according to whom, "Catatonic dementia praecox tends to have hypolipemia". According to Stenberg, quoted by the same authority, "Emotionally dulled cases have lower blood cholesterol and fatty acid concentration and emotionally heightened cases, higher".

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[1] (a) धातुक्षयकरैर्वायुः कुप्यत्यतिनिषेवितैः ॥
चरन् स्रोतःसु रिक्तेषु भृशं तान्येव पूरयन् ।
तेभ्योऽन्यदोषपूर्णेभ्यः प्राप्य वाऽऽवरणं बली ॥
(Aṣ. Hṛ. : Nidāna : *15*; 5-6)

and also

(b) देहे स्रोतांसि रिक्तानि
पूरयित्वाऽनिलो बली ॥
करोति विविधान् व्याधीन्
सर्वाङ्गैकाङ्गसंश्रितान् ।
वायोर्धातुक्षयात् कोपो
मार्गस्यावरणेन च (वा) ॥
(Caraka : Cikit. : *28* : 18.59)

[2] "Schizophrenia is a type of mental disorder, inclusive of what was formerly called dementia praecox, characterized by dissociation, particularly between the intellectual processs and the affective, the latter being also to a great extent disorganized, with many varieties." (James Drever : A Dictionary of Psychology., Penguin Reference Books p. 254., Edition 1955). This condition resembles, in many respects, *unmāda* and *atatvābhiniveśa*, described in *Āyurveda*, both of which *relate* to *manobhighāta*. Extending the reference quoted in page 18 from *Haṭha Yoga Pradīpikā* to the relationship that exists between the *manas* and *vāta*, it may be said that *vāta* is *pravṛddha* in both these conditions.

The table furnished by Brice, referred to by the same author, extracted below, points to "A depression in the level of blood fatty acids and cholesterol which is most pronounced in the group of apathetic, stuporous individuals".[1]

Table IV

Blood Lipid Values in Schizophrenia
(in milligram percent-serum after
A.T. Brice)

Group	No cases	Cholesterol M* E*	Total fatty acids M E
Normal	25	208.6±7.8	577.9±24.6
Dementia Praecox	62	192.0±4.1	509.5±13.2
D.P. apathetic	30	187.4±5.8	491.7±20.9
D.P. active	32	196.2±5.6	526.3±16.1

*M. Mean value.
*E. Probable error of the mean
*D.P. Dementia Praecox

The foregoing apart, it is significant to note that different varieties of diseases, included under the heading *vātavyādhi*, described in *Āyurvedic* classics, appear to have much in common with "Nervous System diseases" as will be seen from details furnished in the table below :—

Table V

Comparative Table of *Vātavyādhi* & Nervous System Diseases

	Particulars of *Vātavyādhi*	Modern Equivalents
1.	*Sāmānya lakṣaṇas of Vātavyādhi*	Nervous-System-Diseases.
2.	*Lakṣaṇas of Dhātugatavāta*	Involvement by *vāta* of *Dhātus* (primary-tissue-complexes), an important characteristic symptoms of which, among others, is the different kinds and degrees of pain.
3.	*Lakṣaṇas of sirā, snāyu, Sandhigatavāta*	Locomotor diseases.
4.	*Lakṣaṇas of āvṛta vāta*	Diseases due to obstruction to the passage of nerve impulses, chemical factors that operate on the nerves either from outside or are present in the nerve itself, as also synaptic disturbances.
5.	*Ākṣepaka group*	This includes varieties of tetanic, convulsive and spastic conditions.
6.	*Pakṣavadha*	Hemiplegia
7.	*Ekāṅgavāta*	Monoplegia
8.	*Sarvāṅgavāta*	Paraplegia
9.	*Ardita*	Facial paralysis
10.	*Hanuagraha*	Trismus (lock jaw)

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[1] Oscar Bodansky. M.D., Ph.D., Professor of Biochemistry, New York University, Post Graduate Medical School, "Biochemistry of Diseases." p.p. 1146-47., Macmillan Publication, Second Edition.

Particulars of *Vātavyādhi*	Modern Equivalents
11. *Manyīstambha*	Torticolis
12. *Jihvāstambha*	Dysphagia, aphonia, aphasia or dysphasia (motor and sensory both).
13. *Gṛdhrasī*	Sciatica
14. *Viśvacī*	Brachial neuritis
15. *Khañja*	Monoplegia
16. *Paṅgu*	Diplegia (tabes dorsalis)
17. *Kalayakhañja*	Lathyrism
18. *Pādadāha*	Peripheral neuritis
19. *Pādaharṣa*	Pins and needle syndrome, hypersthesia. parasthesia, anaesthesia of the foot.
20. *Kampavāta*	Tremors (paralysis agitans)
21. *Khalli*	Cramps of the lower limbs and hands

The discussions, in the preceding pages, have also an immediate bearing on the *mānasika* type of disturbances. The seat of *manas*, according to Bhela, is between *tālu* below and *śiras* above (corresponding to the hard palate and the skull respectively).[1] According to *Atharvaveda*, *Hṛdaya* (interpreted, in this context, as *mastiṣka*) and *śiras* are intimately welded together. Because of this relationship, *vāyu* is located in the upper portion of *mastiṣka* (cerebrum) and it controls everything.[2] Says Caraka, "The part, wherein is contained the vital centres, which is the seat of all senses and which is best among all parts of the body is named as the *śiras*".[3] In the opinion of *Aṣṭāṅga Saṃgraha*, "the *medas* enclosed in skull, has been known as *mastiṣka* or *mastuluṅga*".[4] Ḍalhaṇa has described *mastuluṅga* or brain as being made up of *majjā* which resembles half-melted *ghee*.[5] *Vaidykaśabdāsindhu* has described *majjā* as *śuddha-sneha* or pure fat.[6] This would, in effect, prefer to the predominantly lipid nature of the brain. *Caraka* has further observed that, "the *prakopa* of *vāta* may involve the *indriyas*—sensory and motor—and impair the function of the particular *indriya* involved."[7] There are many more references to the brain which is the seat of *manas* (mind) but the few cited here are sufficient to support the thesis that emotional tensions and instability such as *bhayam* (fear), *krodham* (rage), *viṣādam* (depression states) and the rest, which usually characterize the schizophrenic state, result either in hyper or hypolipemia, as shown by modern researches referred to earlier. ✓

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[1] शिरस्ताल्वन्तरगतं सर्वेन्द्रियपरं मनः।
(Bhela Samhitā : Cikitsā *8*)

[2] मूर्धानमस्य संसीव्याथर्वा हृदयं च यत्।
मस्तिष्कादूर्ध्वः प्रैरयत् पवमानोऽधिशीर्षतः॥
(Atharva Veda *10-2-26*)

[3] प्राणाः प्राणभृतां यत्र श्रिताः सर्वेन्द्रियाणि च।
यदुत्तमाङ्गमङ्गानां शिरस्तदभिधीयते॥
and also प्राणा इति वायवः।
(Caraka Sūtra : *17* ; 12)

[4] तदेव (मेदस) च शिरसि कपालप्रतिच्छन्नं मस्तिष्काख्यं मस्तुलुङ्गाख्यम्।
(Aṣ. Sam. : Śārīra : *6*; 49)

[5] मस्तुलुङ्ग अर्धविलीनघृताकारो मस्तकमज्जा।
(Ḍalhaṇa on Suśruta : Sūtra : *23*; 12)

[6] मज्जा-अस्थ्नः शुद्धस्नेहभागे × × ।
(Vaidyaka Śabdha Sindhu)

[7] श्रोत्रादिष्विन्द्रियवधं कुर्याद् दुष्टसमीरणः॥
(Caraka : Cikit : *28*; 29)

Changes in the metabolism of the brain and, in consequence, changes in the concentration of the blood-lipids apart, there are also several neurologic disorders which effect the function of the locomotor system, either partly or completely, as a result of muscle weakness or paralysis. The following diseases included under *vātavyādhi*, relate, in main, to such locomotor dysfunctions as *sirā*, *snāyu* and *sandhigatavāta*, *khañja*, *paṅgu* etc. These locomotor dysfunctions have been shown to be due to motor nerve paralysis which are reflected by the absence of function of the muscle supplied by the affected nerve. These disabilities are the outcome of tumours of central nervous system, infections, vascular-accidents that occur in the nervous system or degeneration of the neural pathways. Several sensory disturbances may also accompany the motor disorder. Needless to add, these conditions also involve changes in the structure of the nerve and its conductivity.

A classical example of conditions, referred to above, are the group of diseases involving the paralysis, atrophy and flaccidity of the affected muscles and spasticity of the unaffected muscles in poliomyelitis. It has been shown that the involvement of anterior horn cells in poliomyelitis results in two kinds of muscle changes viz., muscles which receive supply from the nerve, the nuclei of which have been destroyed, are paralysed and become atrophic, leading to flaccid paralysis which is a characteristic of this disease. The muscles which are not paralysed become spastic. This adds to considerable discomfort. Disabilities associated with this condition are held to be due to muscle spasm and not due to paralysis as such. The muscles of the back (lumbo-dorsal) have been shown to be spastic even when they are not paralysed. Thus, stiffness and limitation of motion of the lumber and low-dorsal back are considered to be responsible for the disability in these diseases.[1]

Many more examples of the involvement of the nerve, leading to its degeneration and consequent changes in its structure, as reflected by paralysis, flaccidity and spasticity of the muscle involved in and the deformity, pain and discomfort associated with it, can be cited, but the examples under reference, are sufficient to show that the degeneration of the nerve cell with its conducting pathways lead to various changes in the parts supplied by it. The degeneration is of the Wallerian type viz., the decomposition of myelin, the appearance of droplets of kephalin and lecithin and the derivatives of the latter viz., choline, glycerophosphoric acid and unsaturated fatty acids.[2]

Experimental evidences pertaining to altered reactions of a degenerated nerve to electrical responses of the affected nerve and muscle are: (I) loss of excitability of nerve to faradic and galvanic stimulation, failure of the muscle to respond to faradic stimulation, abnormalities of the reaction to galvanic stimulation. These responses constitute the complete reaction of degeneration (C.R.D.). (ii) When the nerve is still capable of being excited by galvanic and not by faradic stimulation and the muscle responds weakly or not at all to the faradic current, the reaction of degeneration is said to be incomplete. (Partial reaction degeneration—P.R.D.).[1]

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[1] Based on : Richard H. Freyberg. "Nervous System Diseases." p. 614, Pathologic Physiology : Saunders Publication, 1951

edition.

[2] Best and Taylor : Physiological Basis of Medical Practice, 5th edition p. 901.

It may be noted that, a significant aspect of *vātavyādhi* is pain of different kinds in paralytic states, as for example, *pakṣavadha*, *sarvāṅgavāta*, corresponding to hemiplegia, and paraplegia, represent but one aspect of *vātavyādhi*, possibly the least painful, except for the extreme disability and helplessness caused by them. The painful types of *vātavyādhi* comprise mostly of *dhātugata vātavyādhis*, *gṛdhrasī*; *viśvācī*, *pādadāha harṣa* etc. Proceeding on the assumption that the term *dhātu*, used in this context, may relate to *sthāyī* or formed *dhātus*, the term *dhātugata-vāta*, would appear to be an analogue of neuritis associated with different kinds of *dhātus* or tissues. *Māmsagatavāta*, for example, presents symptoms resembling those of the involvement of nerves which supply muscle tissue viz., pains of different parts of the body, severe aches, as if the body has been beaten with a cudgel or fist cuffs, pain in different parts of the body and fatigue.[2]

An important point to take note of, in this case as in others, is the fact that demonstrable histological changes of the type of degeneration of myelin sheath with pigmentation and, subsequently, the degeneration of Schawn cells and in some cases, the degeneration of the nerve cells of the sympathetic system, as well as, meduallary degeneration in the spinal tract, posterior columns and nerve roots are seen to be associated with neuritis due to thiamine deficiency and in peripheral neuritis due to other causes. The symptomatology produced in the two conditions, mentioned above, are equally significant. They are "Fatigue, muscular weakness, heaviness and stiffness of the extremeties, parasthesia and tenderness of the nerve trunk and muscle. The symptoms begin distinct, first in the lower extremity, and later there are pain and cramps, severe parasthesia and partial to complete paralysis with atropy of the muscle, which show the reaction of degeneration.[3] It is known now that thiamine is produced in unknown quantities in the large intestine. A reduction in the availability of B group vitamins and, in special, thiamine has been shown to be intimately associated with nerve degeneration.

It is of significance to note that according to *Āyurvedic* classics, the *pakvāśaya*, correrponding to the large intestine has been stated to be main *sthāna* or seat of *śārīra-vāyu*[4] in the sense that, it is in this place that essential materials required for the five *vāyus* are made available or produced. This view is based on an *Aṣṭāṅga Samgraha's* reference and it is supported by modern researches in physiology, microbiology including biochemistry, according to which some of the normal bacterial population of the large intestine synthesise B-group vitamins and, in special, thiamine, in unknown quantities. A reduction in the availability of this vitamin has been shown, in the foregoing paragraph, to be intimately associated with degeneration of nerve.

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[1] Best and Taylor: Physiological Basis of Medical Practice, 5th edition, p. 903.

[2] गुर्वङ्गं तुद्यतेऽत्यर्थं दण्डमुष्टिहतं तथा ।
सरुक् श्रमितमत्यर्थं मांसमेदोगतेऽनिले ॥
(Caraka : Cikit. : *28*; 32)

and also

The possibility of the inflammatory involvement of the neuro-muscular end-plate in the condition described above, cannot be ruled out.

[3] W.A. Sodeman, Nutrition., p. 602, Pathologic Physiology Saunders Publication, London, 1951 Edition.

[4] (i) × × तत्रापि पक्वाशयो
विशेषेण वातस्थानानि ।
(Caraka : Sūtra ; *20* ; 8)

It is, perhaps, necessary to note here that there is a fundamental difference, in the mode of approach to the description of the aetiology, pathogenesis and symptomatology of diseases between the Āyurveda and modern medicine. The former proceeds to describe these with reference to and on the basis of its fundamental doctrine viz., *doṣa*, *dhātu* and *mala*, whereas, the latter, does it in terms of nutritional and metabolic disturbances, infection, injury and histo-pathology etc. Nonetheless, the basic structures, mechanisms and factors involved and change, regardless of the difference in the respective modes of approach and description viz., the loss of *dravya* or substances which enter into the composition of *vātavaha srotāmsi* or the nerve tissue, are identical. Any loss sustained, by this tissue can as well be described in terms of *guṇas* or qualities having regard to the fact, that the concerned structure in its normal state is composed of substances which are predominantly *snigdha*, *picchila*, *bahala*, *guru*, *sthira*, *madhuras* etc. It is obvious that in the group of diseases, under reference, there is a deficit of these *guṇas* corresponding to the loss of substances to which they relate, synchronising with the manifestation of the *rūkṣādi* group of *guṇas*.

The foregoing discussion focuses attention on the fact that the *ātmaguṇas* of *śārīravāyu*, which is but an aspect of universal energy, may not be described in terms of qualities. This is so, because the *śārīravāyu*, like the *lokavāyu*,[1] in its different modes viz. electrical force, cohesive force, frictional force etc., can only be described in terms of work they perform. They are imponderable, intangible and incorporeal; therefore, these forces may elude any qualitative description, but their action can be measured and described

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(ii) आशुकारी मुहुश्चारी पक्वाधानगुदालयः ।
(Suśruta : Nidāna : *1* ; 8)

(iii) तत्र पक्वाशयः कटिः ×× वातस्थानानि ।
अत्र पक्वाशयो विशेषेण ।
(3) (Aṣ. Sam. : Sūtra : *20*; 3)

(iv) वायुः ×× पञ्चात्मा कोष्ठे प्रादुर्भवति ।
(Aṣ. Sam. : Śārîra : 6 : 57)

[1] आदित्यचन्द्रनक्षत्रग्रहगणानां सन्तानगतिविधानम् ।
(Caraka Sūtra : *12*. 8)

and

It will also be seen that the *śārīravāyu* is not different from *lokavāyu* (the physical *vāyu* of the universe) as exemplified by *Caraka's* illustration of the force or power which keeps the sun, moon, the constellations of the star systems and planets in their proper positions and keep them moving in their respective orbits—the fields of gravitation and electromagnetism.

"Until about a hundred years ago electricity and magnetism—while known and sense that, it is in this place that essential materials required for the five *vāyus* are made available or produced. This view is based on an *Aṣṭāṅga Saṃgraha's* reference and it is supported by modern researches in physiology, microbiology including biochemistry, according to which some of the normal bacterial population of the large intestine synthesise B-group vitamins and, in special, thiamine, in unknown quantities. A reduction in the availability of this vitamin has been shown, in the foregoing paragraph, to be intimately associated with degeneration of nerve.

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The foregoing discussion focuses attention on the fact that the *ātmaguṇas* of *śārīravāyu*, which is but an aspect of universal energy, may not be described in terms of qualities. This is so, because the *śārīravāyu*, like the *lokavāyu*,[1] in its different modes viz. electrical force, cohesive force, frictional force etc., can only be described in terms of work they perform. They are imponderable, intangible and incorporeal; therefore, these forces may elude any qualitative description, but their action can be measured and described

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(ii) आशुकारी मुहुश्चारी पक्वाधानगुदालयः ।
(Suśruta : Nidāna : *1* ; 8)

(iii) तत्र पक्वाशयः कटिः ×× वातस्यानानि ।
अत्र पक्वाशयो विशेषेण ।
(3) (Aṣ. Sam. : Sūtra : *20*; 3)

(iv) वायुः ×× पञ्चात्मा कोष्ठे प्रादुर्भवति ।
(Aṣ. Sam. : Śārîra : 6 : 57)

[1] आदित्यचन्द्रनक्षत्रग्रहगणानां सन्तानगतिविधानम् ।
(Caraka Sūtra : *12*. 8)

and

"It will also be seen that the *śārīravāyu* is not different from *lokavāyu* (the physical *vāyu* of the universe) as exemplified by *Caraka's* illustration of the force or power which keeps the sun, moon, the constellations of the star systems and planets in their proper positions and keep them moving in their respective orbits—the fields of gravitation and electromagnetism.

"Until about a hundred years ago electricity and magnetism—while known and quantitatively.[1] Even so, the qualities or properties of the structure and substances through which *śārīravāyu* manifests, can be studied and described.

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studied since early Greek times (in Europe) —were regarded as separate entities. But the experiments of *Oersted* and *Faraday* in the 19th century showed that a current of electricity is always surrounded by a magnetic field and, conversly, that under certain condition, magnetic forces can induce electrical currents. From these experiments came the discovery of the electro-megnetic field, through which light waves, radio waves and all other electro-magnetic disturbances are propagated in space. Thus, electricity and magnetism may be considered as a *single force*. Save for gravitation, nearly all other forces, frictional forces, chemical forces which hold atoms together in molecules, cohesive forces which bind large particles of matter, elastic forces which cause bodies to maintain their shape, are of electro-magnetic origin, for, all of these involve an inter-play of matter and all matter is composed of atoms which, in turn, are composed of electrical particles. (Lincon Barnet; The Universe and Dr. Einsteien p. 15).

[1] "As we know, the *śārīra vāta*, as indeed, the *lokavāyu* are *pāñcabhautic*, the *ākāśa* and *vāyu* elements of the pentad being relatively more dominant than the remaining three. This can be represented as follows :—

$ak^{+}\ va^{+}\ te^{-}\ ap^{-}\ pr^{-} \rightarrow$ *Śārīra-vāyu.*

Quantitatively stated ;

$ak^{x}\ va^{y}\ te^{-z}\ ap^{-a}\ pr^{-b} \rightarrow$ *Śārīra-vāyu.*

It will be seen from the above that the values of *ak* and *va* are greater than those of *te*, *ap* and *pr*. These values are to be determined with reference to the main properties ascribed to their *tanmātrās*. The properties of *tanmātrās*, referred to above, are furnished in the table below :—

Tanmātrā	*Specific pro- Properties*	*Other associated Properties*
Ākāśa (ak^{x})	Vibration (frequencies per second)	....
Vāyu (Va^{y})	Motion (Meteres or feet per second	Vibration
Tejas (te^{-z})	Radiation (Quanta and (Calories)	Vibration motion
Ap (ap^{-a})	Cohesion (Dynes)	Vibration, motion radiation (and heat)
Pṛthvi (pr^{-b})	Gravitation (Dynes, Mass and weight)	Vibration, motion radiation (and heat) and cohesion.

It will follow from the data furnished in the table above that *Śārīvāta* and *loka-vāyu* must have a very small mass value; a relatively small value for the force of cohesion, similarly, a small value for radiation and heat. The more significant and dominant values relate to vibration and motion. The former three forces being negligibly small, they may elude

Proceeding on the basis of considerations referred to in the foregoing, it may be stated that the *guṇas*, as reflected by substances that compose the nerve fibre and which among others, are responsible for the normal functioning of the nerve, can be stated to be those of *vātasamsthāna* and not of the force *vāyu* which works through it.

This view has an immediate and practical bearing on *sneha*, *sveda* and such other therapeutic measures which are esteemed as valuable in the treatment of different kinds of *vātavyādhi*. For, the therapeutic approach to *vātavyādhi* is, from the *Āyurvedic* point of view, through the medium of *sneha dravyas* of animal and vegetable origin viz. *ghṛta*, *taila*, *vasā*, *majjā*, all of which represent lipids.

SECTION IV

THE CONCEPT OF *PITTA*

As compared to the concept of the elusive *vāta*, the concept of *pitta* would appear to include not only material substances but also physical forces. The term material or matter is used here in the sense of all that appeals to our senses, that is to say, matter or material is that which exhibits substantiality. The term physical, on the other hand, refers to various affections of matter, such as force, momentum, elasticity, density, weight, heat, sound etc. These are understood from the effects produced. They do not possess any form and are incorporeal.

This view is implicit in the observation made by *Caraka* about the term *pittāntargatah* and interpreted by Cakrapāṇidatta,[1] according to whom, *agni* does not signify that the *pitta* of the body is flaming fire but it refers only to the phenomenon of heat associated with the functioning of *pitta*, very much like fire, including the phenomenon of light also. Thus, substances included in the concept of *pitta* are material entities and the heat phenomenon, referred to here, is their affectation, i.e. physical force.

This interpretation is based on the *dhātu* or root-meaning and *vyutpatti* or definition of the term *pitta*, furnished in the classical *Āyurvedic* and other allied ancient classics, including authoritative lexicons. Thus, the term *pitta* is seen to be derived from the root '*tapa*'. There are three implications to the root meaning of '*tapa*' viz. (i) '*tapa-dāhe*', meaning, 'to burn'. (ii) '*tapa-santāpe*', meaning 'to

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proper and precise quantitative determination but the latter two viz., vibration, in terms of frequencies per second and motion in terms of meters or feet per second should permit a fairly accurate quantitative determination." (C. Dwarakanath; introduction to Kāyacikitsā, pp. 127-128).

[1] अग्निरेव शरीरे पित्तान्तर्गतः × × ।

(Caraka Sūtra : *12* : 11)

and also
पित्तान्तर्गत इति वचनेन शरीरे ज्वालादियुक्तवह्निनिषेधेन पित्तोष्मरूपस्य वह्नेः सद्भावं दर्शयति ।

(Cakrapāṇi on above.)

(generate) heat' which would appear to have reference to the act of burning the food ingested and, (iii) '*tapa aiśvarye*', to enable the achievement of eightfold benefits viz., *aṇimādi*. These can be summed up in modern scientific parlance as (a) '*tapa-dāhe*' is combustion or oxidation of substances, leading to (b) '*tapa santāpe*', the production of energy (or power) and heat, (c) which, in turn, enables an individual to achieve various *puruṣārthas*, '*tapa aiśvarye*'.[1]

The foregoing can be shown schematically as follows: "*Tapa dāhe*" or the combustion of food "*Tapa santāpe*" or the generation of energy and heat. "*Tapa aiśvarye*" or (which) enables the pursuit and achievement of various objectives (of life).

Or in the alternative: *Āhāra*+*Pitta*→ Energy (heat)→Performance of work.

Tapa-dāhe →*Tapa-santāpe*→*Tapa-aiśvarye* (*aṇimādi*)

In addition, the functions of *pitta* described by *Medini*[2] and *Amarkoṣa*[3] are seen to be '*pāka*', '*pariṇamana*' and '*parāvṛtti*, corresponding to digestion, transformation and mutation respectively. Thus, the main functions of *pitta* are (a) *pacana* (digestion), (b) *dahana* (oxidation or combustion), (c) *tapana* (generation of energy and heat), (d) *pariṇamana* (transformation) and (e) *parāvṛtti* (final change).

The term *pitta*, in its comprehensive sense, includes the group of substances which perform the one or the other of the several functions conforming to the root-meanings and definitions extracted in the foregoing paragraph. That this interpretation of *pitta* is valid from both ancient *Āyurvedic* and modern scientific points of view is seen from the description of the biological and psychological functions ascribed to this category of substances by *Āyurvedic* classics as follows: (i) According to *Caraka*, *paktim* (digestion), *darśanam* (visual perception), *mātrā uṣmaṇah* (normal heat of the body), *prākṛta varṇah* (normal colour and lustre of the body), *śauryam* (prowess), *krodham* (rage) and *prasādam* (cheerfulness and lucidity of the mind).[4] (ii) According to *Suśruta*, *rāgakṛt* (imparts colour to the *rakta*), *paktikṛt* promotes digestion and metabolism), *ojaskṛt* (aids the formation of *ojas*), *tejakṛt* (makes vision possible), *medhākṛt* (causes intellect to function) and *uṣmākṛt* (responsible for the generation of the body heat).[5] (iii) According to *Vāgbhaṭa*, *pitta* is responsible for *pakti* (digestion), *uṣmā* (generation of heat), *darśana* (vision), *ruci* (relish for food), *prabhā* (lustre), *buddhi* (intelligence), *medhā* (memory and intellect), *śaurya* (prowess and valour) and *tanumārdava* (suppleness of the body).[1]

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[1] (i) तप दाहे (चु० उ० से०) तापयति दहति भुक्तमाहारजातमिति पित्तम् ।

(ii) तप संतापे (भ्वा० प० अ०) तपति उष्माणमुत्पादयति इति पित्तम् ।

(iii) तप ऐश्वर्ये (दि० आ० अ०) तप्यते अष्टविधमणिमादिकमैश्वर्यं लम्भयति अभिप्रेतार्थं साधयति इति पित्तम् ।

(Bhaṭṭoji Dīkṣit on Siddhānta Kaumudī

[2] पाक: परिणतौ । पाकः परावृत्तिः ।

(Medinī)

[3] पचा पाके ।

(Amarkoṣa p. 38)

[4] पक्तिमपक्तिं दर्शनमदर्शन् मात्रामात्रत्वमूष्मणः प्रकृतिविकृतिवर्णौं शौर्यं भयं क्रोधं मोहं प्रसादमित्येवमादीनि चापराणि द्वन्द्वानीति ।

(Caraka : Sūtra : *12* ; 11)

[5] रागपक्त्योजस्तेजोमेधोष्मकृत् पित्तं पञ्चधा प्रविभक्तमग्निकर्मणाऽनुग्रहं करोति ।

(Suśruta : Sūtra : *15* ; 3)

In its constitution, *pitta*, as every other manifested substance in the phenomenal world is *pāñcabhautic* with *tejas* element preponderating.[2] In the order of preponderance, *ap* is stated to be next in importance in its *pāñcabhautic* constitution which is stated to account for its fluidity and slight viscosity.[3]

Under the main heading *pittavarga* (group) have been included the following five kinds of *pittas* viz (i) *pācakāgni* (Suśruta) or *pācaka pitta* (*Vāgbhaṭa*) and known variously as *koṣṭhāgni*, *antaragni*, *kāyāgni*, *jaṭharāgni* etc. (ii) *Rañjakāgni* (*Suśruta*) or *rañjaka pitta* (*Vāgbhaṭa*) (iii) *Sādhakāgni* (*Suśruta*) or *sādhaka pitta* (*Vāgbhaṭa*); (iv) *Ālocakāgni* (*Suśruta*) or *alocaka pitta* (*Vāgbhaṭa*) and (v) *bhrājakāgni* (*Suśruta*) or *bhrājaka pitta* (*Vāgbhaṭa*).[4] In addition, five kinds of *bhūtāgnis*,[5] stated to be nascent or potential in the *āhāra dravyas* (food substances) which are activated by the action of *jaṭharāgni*, have been described.[6] The term *jaṭharāgni* has often been used as a synonym[7] of *pācakāgni* (*pitta*) and which, obviously, includes *acchapitta*.[8] Seven *dhātvagnis*, specific to each species of *dhātu*, have been described.[9] *Śoṇita*, known also as *rakta*, has been included under *pitta varga*[10] (group).

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[1] × × पित्तं पक्त्यूष्मदर्शनैः ।
क्षुत्तृड्रुचिप्रभामेधाधीशौर्यतनुमार्दवैः ॥
(Aṣ. Hṛ. : Sūtra : *11* ; 2-3)

[2] × × आग्नेयं पित्तम् ।
(Aṣ. Sam. : Sūtra : *20* ; 3)

[3] यद्द्रवसरमन्दस्निग्ध × × पित्तमूत्रस्वेदादि तदाप्यं रसो रसनं च ।
(Caraka : Śārīra : *7* ; 16)

[4] (i) Suśruta Sūtra : 21 ; 10
(ii) पित्तं पञ्चात्मकम् ।
(Aṣ. Hṛ. : Sūtra : *12* ; 10)
and also पाचकरञ्जकसाधकालोचकभ्राजकभेदाः पञ्चपित्तस्य ।
(Aruṇadatta on above)

[5] भौमाप्याग्नेयवायव्याः पञ्चोष्माणः सनाभसाः ।
पञ्चाहारगुणान्स्वान्स्वान्पार्थिवादीन्पचन्ति हि ॥
(Caraka : Cikit. : *15*:13): 1
and also भौमादयः पञ्चोष्माणः पार्थिवादिद्रव्यव्यवस्थिता जाठराग्निसंधुक्षितबला अन्तरीयं द्रव्यं पचन्तः ।
(Cakrapāṇi on above)

[6] विविधमशितं पीतं लीढं खादितं जन्तोर्हितमन्तरग्निसंधुक्षितबलेन यथास्वेनोष्मणा सम्यग्विपच्यमानं × × ।
(Caraka : Sūtra : 9 *28* ; 3)
and also × × अन्तरग्निना जाठरेण वह्निना × ×
(Cakrapāṇi on above)

[7] (i) जाठरो भगवानग्निरीश्वरोऽन्नस्यपाचकः ।
(Suśruta : Sūtra : *35* ; 27)
(ii) अन्नस्य पक्ता पित्तं तु पाचकाख्यं पुरेरितम् ।
(Aś. Hṛd. : Śārīra : *3* ; 49)
(iii) पचत्यन्नं विभजते सारकिट्टौ पृथक् तथा ।
× × पाचकं नाम तत् स्मृतम् ॥
(As. Hṛd. : Sūtra : *12* ; 11)

[8] परं तु पच्यमानस्य विदग्धस्याम्लभावतः ।
आशयाच्च्यवमानस्य पित्तमच्छमुदीर्यते ॥
(Caraka : Cikit. : *15* ; 10)

[9] (i) सप्तभिर्देहधातारो धातवो द्विविधं पुनः ।
यथास्वमग्निभिः पाकं यान्ति किट्टप्रसादवत् ॥
(Caraka : Cikit. : *15* ; 15)
(ii) यथास्वेनोष्मणा पाकं शारीरा यान्ति धातवः ।
स्रोतसा च यथास्वेन धातुः पुष्यति धातुतः ॥
(Caraka : Cikit. : *8* ; 39)

[10] × × पित्तवर्गे च शोणितम् ।
(Harivamś : Parva : *1* ; 40 ; 52)

The five *pittas* described above may be classified, functionally as follows:—

1. *Pācaka Pitta*
2. (i) *Rañjaka Pitta*
   (ii) *Ālocaka Pitta*
   (iii) *Bhrājaka Pitta*
3. *Sādhaka Pitta*

During the course of academic discussions at the Post-Graduate Training Centre in Ayurveda, Jamnagar in which the concept of *pitta* was critically examined and studied, it was brought out that, the action of *pācakāgni* (*pitta*), at the intestinal and tissue levels, is basic and ubiquitous in the sense that, while it is, according to *Suśruta* and *Vāgbhaṭa*,[1] stated to be located between *āmāśaya* (stomach and *pakvāśaya* (large intestine), moieties of it are stated to be contributed to and they permeate through all the *dhātus*[2] (formed tissues) of the body. This relationship is seen to be unique and from available description of it in the *Āyurvedic* classics, it is seen that the intestine-located *pācakāgni* (*pācakapitta*) augments and supports the seven species of *dhātvagnis* through its moieties referred to above. Not only this, the *pācaka pitta* has also been stated to lend support to and augment the functions of the remaining four *pittas* viz. *rañjaka*, *ālocaka*, *bhrājaka* and *sādhaka*.[3] In this sense, the integrity of *pācakapitta* and its functions are essential for the proper functioning of other *agnis* or *pittas*, present every where in the body. *Pācaka pitta* would, therefore, appear to play a pivotal role in the synthesis of the elements of the body, for which reason, the ancient preceptors of *Āyurveda* traced every disease to the impaired functions of this factor.[4] By the same token, *kāyacikitsā* has been defined as '*antarāgni cikitsā*', the term *antarāgni* being interpreted as *jaṭharāgni* or *pācakāgni*.[5]

Without getting into details, it may be stated that the concept of *pācakāgni* is directly correlated to digestive and metabolic events—intermediary, synthetic and maintenance—of the body as a whole. *Rañjaka*, *bhrājaka* and *ālocaka*, grouped together, relate to colour phenomenon viz., *rañjanam* or coloura-

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[1] (i) × × पक्वामाशयमध्यस्थं × ×
तस्मिन् पित्ते पाचकोऽग्निरिति संज्ञा ।
(Suśruta : Sūtra : *21* ; 10)

(ii) × × तत्र पक्वामाशयमध्यगम् ।
× × करोति बलदानेन
पाचकं नाम तत्स्मृतम् ॥
(Aṣ. Hṛd. : *12* ; 10)

[2] (i) ये पाचकांशा धातुस्थाः तेषां मांद्यात् तैक्ष्ण्यतः ।
वृद्धिक्षयं च धातूनां जायते श्रुणु चाऽपरम् ॥
(Aṣ. Sam. : Sūtra : *19* ; 16)

(ii) स्वस्थानस्थस्य कायाग्नेरंशा धातुषु स्थिताः ।
तेषां सादातिदीप्तिभ्यां धातुवृद्धिक्षयोद्भवः ॥
(Aś. Hṛd. : Sūtra : *11* ; 34)

[3] (i) तत्रस्थमेव च आत्मशक्त्या शेषाणां पित्तस्था-
नानां शरीरस्य चाग्निकर्मणाऽनुग्रहं करोति
तस्मिन् पित्ते पाचकोऽग्निरिति संज्ञा ।
(Suśruta Sūtra : *21* ; 10)

(ii) तत्रस्थमेव पित्तानां शेषाणामप्यनुग्रहम् ।
करोति बलदानेन पाचकं नाम तत्स्मृतम् ॥
(Aṣ. Hṛ d. : Sūtra ; *12* ; 1

[4] रोगाः सर्वेऽपि मन्देऽग्नौ × × ।
(Aṣ. Hṛd. : Nidāna : *12* ;

[5] (i) कायस्यान्तराग्नेश्चिकित्सा ।
(Cakrapā

(ii) कायचिकित्सेति कायस्यान्तराग्नेश्चिकित्सा
(Gaṅgādhar

tion of *rasa* when it is spoken of as *rakta*.[1] The latter performs functions described as *jīvanam*[2] and *varṇakāraṇam*, confer different colours to the skin, hair, and other parts of the body[3] and, *rūpakaram* relates to *ālocaka* in the eye which is held to be responsible for vision and appreciation of colours.[4] These obviously refer to *pittas* which are responsible for the production of substances that confer colour to various structures and participate in activities, concerned with photo- and chemosynthetic activities, as well as the capacity to carry oxygen. As regards *sādhaka pitta* it would appear, from careful study of available material, to be a very complex factor or possibly factors that determine the integrity of the apparatus of intelligence, memory, thought, intellect and emotions.[5]

The pivotal role of pācaka pitta :

A careful study of the contributions said to be made by *pācaka pitta* to the vital activities of the body, will emphasise its importance. This *pitta* would appear, in the first instance, to be involved in different *bhāvas* or aspects of gastro-intestinal digestion viz. *madhura* (sweet), *amla*, (sour/acid) and *kaṭu*[6] (pungent/acrid). They, obviously, correspond respectively, to sugar (carbohydrate) digestion in the fundus of the stomach, protein digestion in the greater part of the stomach and small intestine including the final stages of the digestion of sugars and fats and the formation of faeces, accompanied by the putrefactive action of the colonal flora on the food residue, especially the protein fractions of it, yielding, in the process, various pungent and disagreeably smelling gases e.g. indol, skatol, hydrogen sulphide, ammonia etc. Not only this, the last of the *bhīvas* or aspects of the gastro-intestinal digestion is also seen to provide *dravyas* which are stated to be the *poṣaka dravyas* or the five kinds of *śīrīravāyu.*[1]

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[1] (i) यत्तु यकृत्प्लिनोः पित्तं तस्मिन् रञ्जकोऽग्निरिति संज्ञा, स रसस्य रागकृदुक्तः ।
(Suśruta : Sūtra : *21* ; 10)

(ii) आमाशयाश्रयं पित्तं रञ्जकं रसरञ्जनात् ।
(Aṣ. Hṛd. : Sūtra : *12* ; 13)

(iii) पित्तोष्मणः स रागेण रसो रक्तत्वमृच्छति ।
(Caraka Cikit. : *15* ; 28)

[2] रक्तं × × जीवयति च ।
(Suśruta : Sūtra : *15* ; 6)

[3] (i) यत्तु त्वचि पित्तं तस्मिन् भ्राजकोऽग्निरिति संज्ञा, सः × × छायानां च प्रकाशकः ।
(Suśruta : Sūtra : *21* ; 10)

(ii) तत्र भ्राजको नाम यो यस्य शरीरं लक्षणं चोपगमयति, प्राधान्यं दर्शयति, शिरःपाणिपादपार्श्वपृष्ठोदरजङ्घाम्भ (स्य) नखनयनकेशानां च प्रतिभाविशेषानुत्पादयति, भ्राजयतीति भ्राजकः ।
(Bhela Samhitā)

[4] (i) यद्दृष्टयां पित्तं तस्मिन्नालोचकोऽग्निरिति संज्ञा, स रूपग्रहणाधिकृतः ।
(Suśruta : Sūtra : *21* ; 10)

(ii) तत्रालोचको नाम वर्षाशीतातपप्रवृद्धः । सः द्विविधः-चक्षुर्वैशेषिको बुद्धिवैशेषिकश्च ।
(Bhela Samhitā)

[5] (i) यत् पित्तं हृदयसंस्थं तस्मिन् साधकोऽग्निरिति संज्ञा, सोऽभिप्रार्थितमनोरथसाधनकृदुक्तः ।
(Suśruta : Sūtra : *21* ; 10)

(ii) साधको नाम या (यः) शब्दस्पर्शगन्धेभ्योऽर्थकामेभ्यश्च देवपितृऋषिभ्यश्च इह चामुत्रकानां पदार्थानां निःश्रेयसमधिकृत्य सर्वपदार्थानां (ना) नो (प्नो) ति स्वयुक्त्या साधयतीति साधकः ।
(Bhela Samhitā)

[6] अन्नस्य भुक्तमात्रस्य षड्रसस्य प्रपाकतः ।
मधुराद्यात् कफो भावात् फेनभूत उदीर्यते ॥
परं तु पच्यमानस्य विदग्धस्याम्लभावतः ।
आशयाच्च्यवमानस्य पित्तमच्छमुदीर्यते ॥
पक्वाशयं तु प्राप्तस्य शोष्यमाणस्य वह्निना ।
परिपिण्डितपक्वस्य वायुः स्यात् कटुभावतः ॥
(Caraka : Cikitsā : *15* ; 9-11)

It has been shown that some of the intestinal bacteria synthesize B-group vitamins viz. thiamine, riboflavin, nicotinic acid or niacin, biotin etc. A part supply of the B-vitamin group is said to be obtained from the activities of intestinal bacteria and a part, from outside sources. Thiamine is stated to be provided in unknown quantities by the intestinal flora. It is now known that the degeneration of nerve cells of the sympathetic system as well as medullary degeneration in the spinal tract, posterior columns and nerve roots are associated with thiamine deficiency.

The *avasthāpāka*, comprising three *bhāvas*, described above, would represent a broad-based generalisation of the qualitative changes to which food substances are subjected during the process of gastro-intestinal digestion. The mechanism responsible for and factors involved in the gastric and intestinal digestion, under the influence of *jaṭharāgni*, described in the *samhitā granthas* also represent a broad-based generalisation of the secretory and chemical activities that take place in this region. It will be of interest to note that this concept comprehends factors responsible for stimulating the secretion of digestive juices and the action of the latter on food. While describing the *avasthāpāka*, Caraka has stated that the *anna* which had attained *amlabhāva* is rendered *vidagdha*. The term *vidagdha* has been interpreted by Cakrapāṇidatta and Gaṅgādhara Sen, in this context, as *pakvāpakvam* and *kiñcit pakvam kiñcit apakvam*, respectively, meaning, partly digested. In other words, the outcome of digestion in this part of *āmāśaya* (stomach) is the production of partly digested food which has now become acidic and which is propelled into the next lower and contiguous portion of the *koṣṭha* when *acchapitta* is stated to be discharged into this place. The term *accha* has been interpreted as *aghanam* or light and *svaccha* or clear by Cakrapāṇidatta and Gaṅgadhara Sen respectively.[1]

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[1] वायुः × × × पञ्चात्मा कोष्ठे प्रादुर्भवति ।

(Aṣ. Sam. : Sārīra : 6 ; 67)

and also

Pakvāśaya is said to be the main *sthāna* or seat of *vāta*. There is no direct or clear mention in the *granthas* to the particular *vāta* which is the *sthānī* of this part of the *Koṣṭha*. *Samāna*, which is stated to be located near *agni* and to move always through the *koṣṭha* (gastro-intestinal tract, including *pakvāśaya*, corresponding to large intestine) may be considered as the *vāyu*, specially, concerned with *pakvāśaya*. As regards the claim of *apāna*, the seat of which has been described as *apānaga*, which term stands for *guda* or rectum it moves through the *śroṇi* (pelvic cavity), *basti* (bladder), *medhra* (male-genitals and *yoni* in the case of female) and *sakthi* or thighs. It is seen that *Caraka* and *Vāgabhaṭa*, have not mentioned *apāna* as the *vāyu* of *pakvāśaya*. But *Suśruta* has included *pakvasāya* also as one of the *sthānas* of *apāna*.

In the absence of any direct reference to the particular *vāyu* which as the *sthāni* of *pakvāśaya*, one may have to treat both *samāna* and *apāna* together or in the alternative, consider the reference made by *Aṣṭāṅga-Samgraha*, to the five kinds of *vāyu* produced in this part of *koṣṭha*, as a more likely explanation. The *Samgraha's* reference, mentioned above, has been interpreted to mean, that this part of the *koṣṭha* is the place where essential materials required by five kinds of *vāyu* are made available or produced. This latter view finds support from facts made available by modern physiology, microbiology including biochemistry, according to which some of the bacterial population of the large intestine synthesise the B-group of vitamins and, in special, thiamine, the latter, in unknown quantities. A deficiency of this vitamin has been shown to be associated with the degeneration of nerve.

The implications of Caraka's description, as above, of the digestive events that occur in the stomach and duodenum is reminiscent of the secretion and discharge of bile and pancreatic juice into the duodenum as the acidified chyme passes down from the pylorus to the duodenum.

It has been shown that the acidity of the chyme stimulates Brunner's glands in the duodenal mucosa to secrete a number of internal secretions viz., secretin,[2] pancreoxymin,[3] cholecystoknin[4] and enterogastrone.[5] Between them, secretin and pancreoxymin have been shown to stimulate the pancreas to secrete and discharge its juice, while cholecystoknin has been shown to stimulate the gall-bladder to discharge its contents i.e. bile. It is well known that both bile and pancreatic juice are discharged into the duodenum through the Ampulla of Vater. Likewise, another hormone, known as enterocrinin, is stated to be secreted by the glands in the intestinal crypts which, in turn, is stated to stimulate the secretion of succus entericus.[6]

It would appear that the term *jaṭharāgni* and its various affections viz. *pācaka pitta*, *pācakāgni*, *kosṭhāgni*, *antaragni* etc. represent a total concept comprising several gastro-intestinal digestive secretins which bring about the breakdown of the various components of the food—*bhinna saṅghata*—into their elemental forms without involving any change in their composition. Thus, *madhura* (sweet) and *lavaṇa* (saline/salt) fractions of the food are stated to undergo *madhura vipākam*, under the influence of *jaṭharāgni ; amla* as *amla vipākam* likewise : and *kaṭu*, *tikta* and *kaṣāya* fractions into *kaṭu vipāka*, similarly.[1]

---

[1] (i) परं तु पच्यमानस्य विदग्धस्याम्लभावतः ।
आशयाच्चव्यमानस्य पित्तमच्छमुदीर्यते ॥
(Caraka : Cikit. : *15* ; 10)

and also

(ii) विदग्धस्येति पक्वापक्वस्य । अम्लभावत इति जाताम्लस्वरूपतः । आशयात् आमाशयात् । × × अनेन च पित्तस्थानसम्बन्ध विदग्धाहारस्य दर्शयति । अच्छमिति अघनम् ।
(Cakrapāṇidatta on above)

(iii) विदग्धस्य अर्धपरिपक्वस्य । अच्छम्-स्वच्छम् ।
(Gaṅgādhara Sen on above)

[2] West & Todd : Text book of Biochemistry: Macmillan publication : Edition 1955. pp. 475, 1292.

[3] Ibid. pp. 475, 1292.

[4] Ibid. pp. 489, 1292.

[5] Ibid. pp. 471, 1293

[6] Best & Taylor, "Applied Physiology" p. 536-37 1953 Edition.

Jaṭharāgnipāka is seen to ultimately result in the separation of the *sāra* or the nutrient fraction from the *kiṭṭa* or the residue fraction of the food ingested.[2] The former is stated to be absorbed from the *āmāśaya*[3] after being subjected to *bhūtāgni pāka*, whereas, the latter is said to be propelled into the *pakvāśaya* for further transformations before the *purīṣa* (faecal matter) is formed and evacuated, at periodical intervals.

It is now necessary to examine the wider implications of *pācakapitta*. It is seen from Caraka, Suśruta and Vāgbhaṭa that, the influence of this *pitta* extends to all the tissues. Caraka has stated that *jaṭharāgni* is the leader and root of all *agnis* in the body, on the *vṛddhi* or *kṣaya* of which depends the waxing and waning of the activity of other *agnis*.[4]

Says Suṣruta : "Due to hidden and unexplainable dispensation, the *pitta* located between *pakvāśaya* and *āmāśaya* (not only) digests the four kinds of the food and separates the *doṣas*, *rasa* and *purīṣa* but also, though situated in this place, due to its own natural (inherent) properties, it enables the remaining *sthānas* of *pittas* in the performance of *agni-karmas* of their *pittas*. Hence, this *pitta* is spoken of as *pācaka-pitta*",[5] Describing the seat of this *pitta*, he has stated that, "the sixth *kalā* known as *pittadharakalā*, which is situated between *pakvāśaya* and *āmāśaya*, is known as *grahaṇī*. The integrity of *grahaṇī*, in his view, depends on *agni* and, the latter, is located in the former. Any impairment of *agni*, necessarily, affects the integrity of *grahaṇī*[6] and *vice versa*.

---

[1] (i) परं चातो विपाकानां लक्षणं संप्रवक्ष्यते ।
कटुतिक्तकषायाणां विपाकः प्रायशः कटुः ॥
अम्लोऽम्लं पच्यते स्वादुर्मधुरं लवणस्तथा ।
(Caraka : Sūtra : 26 : 57-58)

(ii) जाठरेणाग्निना योगाद्यदुदेति रसान्तरम् ।
रसानां परिणामान्ते स विपाक इति स्मृतम् ॥
(Aṣ. Hṛd. : Sūtra. : *9* ; 20)

(iii) त्रिधा विपाको द्रव्यस्य स्वाद्वम्लकटुकात्मकः ।
(Aṣ.. Hṛd. : Sūtra : *1* ; 17)

[2] (i) किट्टं सारश्च तत्पक्वमन्नं सम्भवति द्विधा ।
(Aṣ. Hṛd. : Śārira : *3* ; 60)

(ii) पचत्यन्नं विभजते सारकिट्टौ पृथक् तथा ।
× × पाचकं नाम तत्स्मृतम् ॥
(Aṣ. Hṛd. : Sūtra : *12* ; 11-12)

[3] आमाशयगतः पाकमाहारः प्राप्यकेवलम् ।
पक्वः सर्वाशयं पश्चाद्धमनीभिः प्रपद्यते ॥
(Caraka : Vimāna : *2* ; 18)

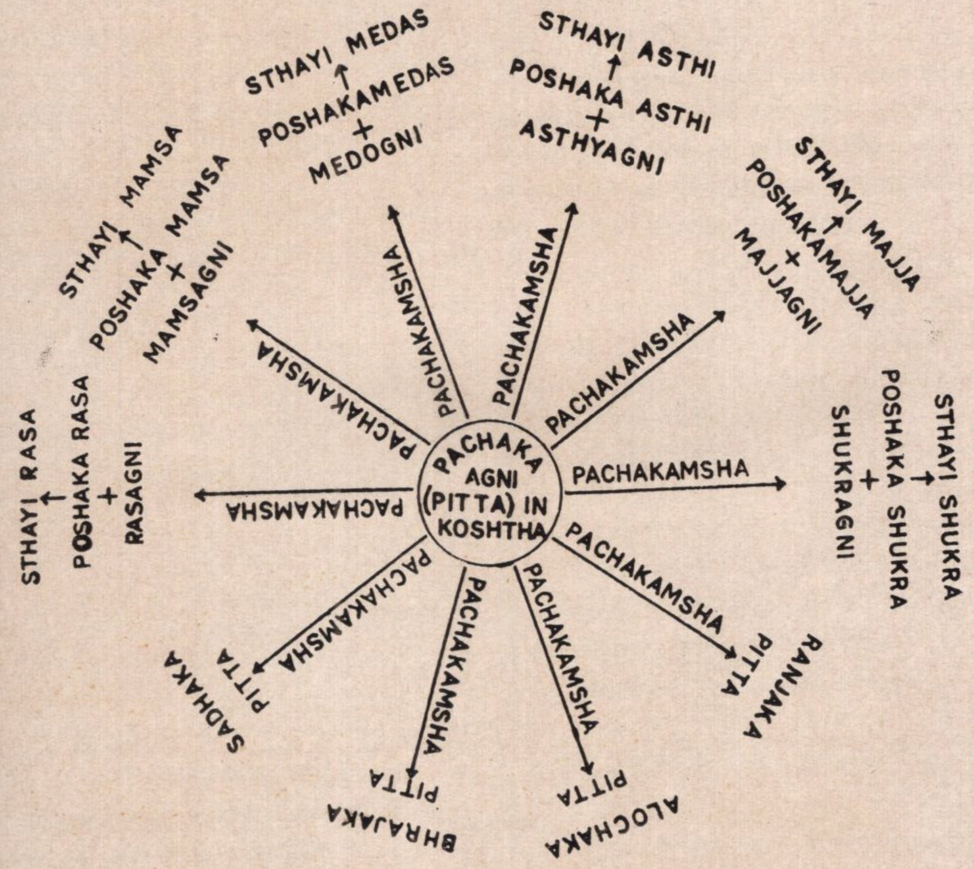
[4] अन्नस्य पक्ता सर्वेषां पक्तॄणामधिपो मतः ।
तन्मूलास्ते हि तद्वृद्धिक्षयवृद्धिक्षयात्मकाः ॥
(Caraka Cikit. : *15* ; 39)

[5] तच्चादृष्टहेतुकेन विशेषेण पक्वामाशयमध्यस्थं पित्तं चतुर्विधमन्नपानं पचति, विवेचयति च दोषरसमूत्रपुरीषाणि, तत्रस्थमेव चात्मशक्त्या शेषाणां पित्तस्थानानां शरीरस्य चाग्निकर्मणाऽनुग्रहं करोति, तस्मिन् पित्ते पाचकोऽग्निरिति संज्ञा ।
(Suśruta : Sūtra : *21* ; 10)

[6] षष्ठी पित्तधरा नाम या कला परिकीर्तिता ।
पक्वामाशयमध्यस्था ग्रहणी सा परिकीर्तिता ॥
ग्रहण्या बलमग्निर्हि स चापि ग्रहणीं श्रितः ।
तस्मात् संदूषिते वह्नौ ग्रहणी संप्रदुष्यति ॥
(Suśruta : Uttar : *40* ; 169-170)

PLATE I

The relatioa between *Pāchaka pitta* (Agni) in koshtha, on the one hand, and other *pittas* and *agnis* elsewhere in the body, on the other, can be schematically represented as follows :—


PACHAKA AGNI (PITTA) IN KOSHTHA
PACHAKAMSHA
STHAYI RASA
POSHAKA RASA
RASAGNI
STHAYI MAMSA
POSHAKA MAMSA
MAMSAGNI
STHAYI MEDAS
POSHAKAMEDAS
MEDOGNI
STHAYI ASTHI
POSHAKA ASTHI
ASTHYAGNI
STHAYI MAJJA
POSHAKAMAJJA
MAJJAGNI
STHAYI SHUKRA
POSHAKA SHUKRA
SHUKRAGNI
RANJAKA PITTA
ALOCHAKA PITTA
BHRAJAKA PITTA
SADHAKA PITTA

Representation of the Contribution *Pāchaka pitta* is Stated to Make to Life Activities.

Vāgbhaṭa has, in his *Aṣṭāṅga Hṛdaya*, stated that this *pitta* is present in an area between *pakvāśaya* and *āmāśaya ;* in its constitution, it is *pāñcabhautic ;* it is *drava* (liquid) in consistency inspite of which, it performs actions similar to those of *anala* (fire) largely due to the actualisation of the *tejas* component over the remaining members of the pentad. This is inferred by the way in which it performs *pākādikarmas*, i.e. it digests food and separates the *sāra* from the *kiṭṭa*. In addition, while being located in its own place, it contributes to and augments the functions of other *pittas* elsewhere in the body.[1] Again, he has stated, that, "Moieties of *kāyāgni*, which latter is located in its own place, are distributed to and permeate all *dhātus*. A decrease of it makes for an increase of *dhātus*[2] while an increase of it makes for a decrease of *dhātus*." As though to amplify the foregoing, he has described the influence of *pācaka pitta* on *dhātus* in his *Samgraha* as follows :—

"A decrease or increase of the *dhātus* (as the case may be) occur, according as the aspects (moieties) of *pācaka* (*pitta*) present in them are *tīkṣṇa* or *manda*, (as the case may be)".

"As the flame of a forest fire tends to increase or decrease according as the *indhana* (fuel) available (in its proximity), so also is the case with the *dhātuparamparā*.

"*Dravyas* are either *tulya* (homologous) or *viśiṣṭa* (heterologous) to the *dhātus* which cause an increase or decrease respectively of the *dhātus* due to properties inherited by or potentially present in them, as in the case of a seed.

"Homologous properties of *dravyas* cause a rapid increase of identical qualities or similar properties in the *dhātus*,[3] whereas, *dravyas* possessing heterologous qualities make for a rapid decrease of *dhātus*".

Stated in simple terms, the foregoing references to *pācakapitta*, envisage a relationship that is stated to exist between this factor located in the *koṣṭha* and metabolic events of the body. It carries with it a suggestion that metabolic events depend upon the *amśas* of *pācaka pitta*, contributed to *dhātus*. The simile of *dāvāgni* (forest fire) and *indhana* (fuel) is significant. It seeks to illustrate the normal growth and development of the *dhātus* when the *pācakamśas* present in the latter are normal and *indhana*, corresponding to *poṣaka dravyas*, (nutrient substances) are freely available. On the contrary, a deficiency of *indhana* (fuel) is stated to result in the *dhātus* themselves being burnt up by *pācakāmśas*, thus, making for the *kṣaya* (wasting) of the former; contrawise a deficiency or impairment of *pācakāmśas* in the *dhātus* is stated to lead to the *vṛddhi* of the latter.

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[1] × × तत्र पक्वामाशयमध्यगम् ।
पञ्चभूतात्मकत्वेऽपि यत्तैजसगुणोदयात् ।।
त्यक्तद्रवत्वं पाकादिकर्मणाऽनलशब्दितम् ।
पचत्यन्नं विभजते सारकिट्टौ पृथक् तथा ।।
तत्रस्थमेव पितानां शेषाणामप्यनुग्रहम् ।
करोति बलदानेन पाचकं नाम तत्स्मृतम् ।।
(Aṣ. Hṛd. : Sūtra : *12* ; 10-12)

[2] स्वस्थानस्थस्य कायाग्नेरंशा धातुषु संश्रिताः ।
तेषां सादातिदीप्तिभ्यां धातुवृद्धिक्षयोद्भवः ।।
(Aṣ. Hṛd. : *11* ; 34)

[3] ये पाचकांशा धातुस्थास्तेषां मान्द्यातितैक्ष्ण्यतः ।
वृद्धिक्षयश्च धातूनां जायते शृणु चापरम् ।।
पारंपर्येऽपि दावाग्नेस्तत्तत्प्राप्येन्धनं शिखा ।
वृद्धिक्षयौ यथा याति तथा धातुपरम्परा ।।
द्रव्यं तुल्यं विशिष्टं हि स्वं स्वं वृद्ध्यै क्षयाय च ।
प्रत्यात्मबीजनियतं भृशमाशु प्रजायते ।।
(Aṣ. Sam. *19* ; 16-18)

The foregoing would recall to one's mind the phenomenon of hypermetabolism (associated with the hyperactivity of the thyroid) or hypo-metabolism (associated with thyroid deficiency). It is well known that the thyroid hormone[1] participates in oxidative reactions in the tissues. The description of hypermetabolism closely resembles the symptomatology of *atyagni*, known also as *bhasmaka*. The former is characterised by voracious hunger and the feeling of the heat all the time; despite ravenous food consumption, so much is burnt that the body weight decreases; the patient is under constant nervous tension and highly irritable yet, unable to perform sustained work due to the depletion of the fuel reserves. This is followed by retarded growth. The symptomatology of *atyagni*/*bhasmaka* can be briefly summarised thus: The body is rendered dry, the patient digests the ingested food as often as it is eaten. Having thus consumed the all-too-frequent meals the *agni* begins to consume the *śārīra-dhātus* such as *rakta* etc. The patient is then afflicted with extreme weakness and becomes susceptible to diseases leading ultimately to his death. His hunger for food appears to be whetted when he had taken food but he feels faint soon after the completion of the digestion. *Tṛt* ((thirst), *śvāsa*, (dysponea), *dāha* (feeling of heat and burning sensation) and *mūrcchā* (loss of consciousness) etc., are symptoms which manifest as the result of overactive *pācakāgni* i.e., *atyagni*.[2]

The case of a deficit of *pācakāmśas* in *dhātus*, leading to *dhātuvṛddhi* can be illustrated with the example of low thyroid availability which leads to the development of myxoedema—a condition characterised by a reduction of mental and bodily vigour, the loss of sex drive, the loss of hair and abnormal thickening of the skin as if much water has acumulated in it, (i.e. oedema) leading to an increase of body weight since less food is used up in cells and much of it is stored up as fat.

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[1] It has been suggested that thyroxin may enter into some enzyme system in the tissue.

[2] (i) नरे क्षीणकफे पित्तं कुपितं मारुतानुगम् ।
स्वोष्मणा पावकस्थाने बलमग्नेः प्रयच्छति ॥
तदा लब्धबलो देहेऽतिरूक्षे सानिलोऽनलः ।
परिभूय पचत्यन्नं तैक्ष्ण्यादाशु मुहुर्मुहुः ॥
पक्त्वाऽन्नं स ततो धातूञ्छोणितादीन् पचत्यपि ।
ततो दौर्बल्यमातङ्कान्मृत्युं चोपनयेन्नरम् ॥
भुक्तेऽन्ने लभते शान्तिं जीर्णमात्रे प्रताम्यति ।
तृट्श्वासदाहमूर्च्छाद्या व्याधयोऽत्यग्निसम्भवाः ।
(Caraka : Cikit. : *15* ; 217-221)

(ii) यः प्रभूतमप्युपयुक्तमन्नमाशु पचति स तीक्ष्णः स एवाभिवर्धमानोऽत्यग्निरित्याभाष्यते, स मुहुर्मुहुः प्रभूतमप्युपयुक्तमाशुतरं पचति, पाकान्ते च गलताल्वोष्ठशोषदाहसन्तापाञ्जनयति ।
(Suśruta : Sūtra : *35* ; 24)

The significance of the alleged mutual relationship that is stated to exist between the *pācakāgni* (*pitta*) and *dhātus* assumes a new complexion, in view of the more recent researches in the field of enzymology. It has been shown that a group of heterogeneous enzymes, known as cathepsins or intracellular proteinases, are found in most animal tissues and organs. The richest source of cathepsins are stated to be the liver, kidney and spleen. As yet four different cathepsins have been isolated from the spleen and kidney. It is also held that catheptic enzymes may be present in the gastric-juice. Cathepsins are essentially proteolytic in nature. Of them, cathepsins I, II, III and IV have been shown to be homologous to pepsin, trypsin, amino-peptidase and carboxypeptidase, respectively, in so far as their proteolytic activities are concerned. In the alimentary tract, enzymes belonging to the cathepsin group convert the whole protein into amino acids by hydrolysis (i.e., by the addition of water to protein). These enzymes are pepsin, trypsin, dipeptidase etc. On the other hand, amino acids, in each cell of the organism, become proteins by dehydration (i.e., by the withdrawal of water from amino-acids). According to Weisz, "The enzymes necessary here are very similar to (or perhaps) the same as those in the gut. They are collectively referred to as cathepsins."[1] He has drawn attention to the fact that "Enzymes may act catalytically in either direction; cathepsins could, indeed, digest proteins in the gut (or in the test tube) and pepsin trypsin, etc., could synthesize protein in cells. Ordinarily conditions of mass action and energetics are such that protein synthesis is appreciable only in living cells, while digestion predominates in the gut."[2]

He has emphasised the fact that enzymes are indifferent to reaction-direction and has illustrated this with the example of cathepsins. "After death, when reaction energy and amino acid raw materials are no longer supplied, these same enzymes decompose the protein which they orignally aided to build. Post-mortem disintegration is partly due to this, partly due to bacterial decay."[3]

Cathepsins would appear to be a generic group, the members whereof are to be found both in the gut as well as in the tissues—the former being mainly concerned with protein splitting by hydrolysis, and the latter, with the synthesis of amino acids into protein by dehydration. Under conditions of starvation when, the flow of nutrition to the tissues becomes less or probably absent, the tissue-cathepsins may proceed to hydrolyse the tissue-protein leading to their disintegration. Here is a very close analogy to the situation envisaged in Vāgbhaṭa's simile of *pācakāmśas* present in *dhātus* which, in the absence of *indhana* (fuel), consume *dhātus* very much like the forest-fire (*davāgni*) consuming trees in the dense jungle and extinguish itself in a sparsely vegetated forest.

As a logical corollary, it may be posited that thyroxin may enter into this system and participate in oxidative aspects of its reactions. Another probable intestinal contribution to the regulation of cathepsins cum thyroxin activities in the tissues may be envisaged to occur through the agency of anterior pituitary. This hypothesis is offered on the basis of the observation made by Dwarakanath *et al*,[1] in the course of their studies on the effect of a crude aqueous extract of the gastro-intestinal mucosa in ascites. It was noted in the course of this study carried out at Mysore (1950-52) and Jamnagar (1957-58), that, the administration of this extract was followed by an extraordinary diuresis in cases of *jalodara* or ascites, whereas, the average urine output, in a large number of cases prior to the administration of the extract was as low as 12 oz. in 24 hours. This phenomenon was sought to be accounted for by authorities entitled to opinion, as probably due to the action of some substance present in duodenal mucosa on the antidiuretic hormone of the posterior pituitary. The possibility of a regulating influence by yet another factor which may be present in duodenal glands on thyrotropic hormone of the anterior pituitary was speculated. If this hypothesis is experimentally established, a complete picture of the regulating influence alleged to be exercised by *pācaka pitta* on *dhātus* may be expected to become clear.

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[1] Weisz : Biology : p. 349 : Edition 1954 ; Mc Graw-Hill, New York publication.

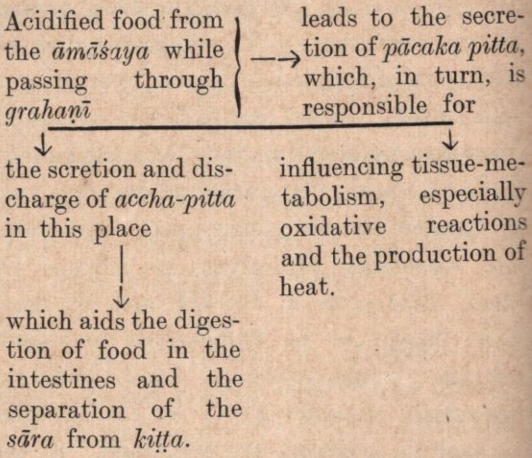
[2] Ibid p. 349.

[3] Ibid. p. 61.

An important fact that emerges from the discussion above, relates to the functional importance of *agni* (*kāyāgni*) to all vital activities of the body, including intermediary metabolism, as well as synthesis and maintenance metabolism.

The schema extracted below will illustrate the point.

SCHEMA : III[2]



Acidified food from the *āmāśaya* while passing through *grahaṇī* → leads to the secretion of *pācaka pitta*, which, in turn, is responsible for

the scretion and discharge of *accha-pitta* in this place

which aids the digestion of food in the intestines and the separation of the *sāra* from *kiṭṭa*.

influencing tissue-metabolism, especially oxidative reactions and the production of heat.

The emphasis laid on the need to promote *koṣṭhāgni* and thus improve the *dhātvagnis*, in the course of the *Pañcakarma* therapy will thus be explained, for it is the impairment of this *agni* that is stated to result in the production of *āmādoṣas* which, in turn, is stated to produce *srotorodha*, resulting in the *sañcaya* or accumulation of the *doṣas* (morbific factors) in *dhātus*. The situation envisaged here bears a close resemblance to metabolic histotoxic-anoxia which may become the basis for the manifestation of varieties of syndromes.

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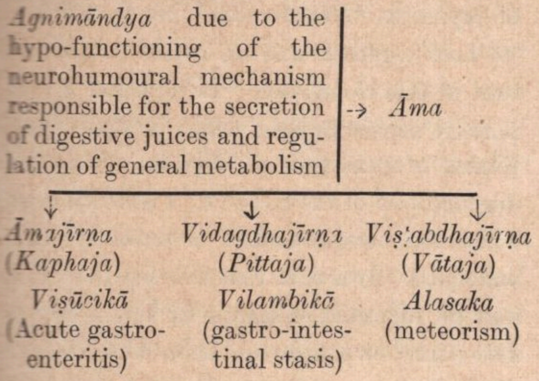
[1] C. Dwarakanath : Lakshmi Narayan Rao : Subramanyan : A Brief Report on the Preliminary Observations on the effect of 'Agnidhara Kala Sara' or a composite acqueous extract of Gastric and Duodenal Mucosa in cases of '*Śotha*' (oedema) and *Jalodara* (ascites) : "Antiseptic" June 1957.

[2] based on Caraka : Cikitsā : 15 ; 9-19. and also C. Dwarakanath : Introduction to Kāyacikitsā : p. 133

SCHEMA : IV[1]


Agnimāndya due to the hypo-functioning of the neurohumoural mechanism responsible for the secretion of digestive juices and regulation of general metabolism
Āma
Āmajīrṇa
(Kaphaja)
Visūcikā
(Acute gastro-enteritis)
Vidagdhajīrṇa
(Pittaja)
Vilambikā
(gastro-intestinal stasis)
Viṣṭabdhajīrṇa
(Vātaja)
Alasaka
(meteorism)

The foregoing will highlight the significance attached to *koṣṭhāgni* (*kāyāgni*) in Āyurveda. All therapeutic measures in *kāyacikitsā*, as pointed elsewhere, are calculated to the restoration and maintainance of this *agni*. In passing, it may be stated that, the impairment of *koṣṭhāgni* or *pācakāgni* or *pācakapitta* as it is variously known, may lead to the disturbance of other *agnis* or *pittas*, including the *rañjaka*, *ālocaka*, *sādhaka* and *bhrājaka*.

SECTION V

THE CONCEPT OF *KAPHA*

In the concept of *kapha*, we are called upon to deal with the matter stuff basic to life. The physical[2] and functional[3] aspects of *kapha*, as described in *samhitāgranthas* point to a concrete and stable substance on which depends the integrity of body, especially, the structural, immunological and reproductive. The structural, would appear to relate to the contribution it makes to *sthairya* (stability) of the body. *Bala* relates to the capacity for the performance of work by overcoming opposition.[4] Studied from the point of view of *dhātus*, which are stated to be its *sthānas*, the following come up for consideration viz. *rasa*, *māmsa*, *majjā* and *śukra*[1]. Of these, the more substantial *dhātus*, in the order of their bulk or quantity, are the *māmsa*, the *medas* and the *rasa* corresponding to the muscle-tissue, adipose-tissue and the blood—plasma (including the fluids of the body)—intracellular and extracellular. In fact, all these connective tissues hold considerable quantity of body water. This is in keeping with root meaning and definition of *kapha* as "*Kena jalena phalati*", meaning *kapha* is the fruition or outcome of water and one of its important functions is described as *udakakarma* (Suśruta) meaning "The function of fluids". Much of body water, as it is known today, is locked up as part of the protoplasm of the tissues. The extra-cellular fluids, referred to above are in general, represented by the five[2] kinds of *kapha* viz., *bodhaka* etc.

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[1] अजीर्णमानं विष्टब्धं विदग्धं च यदीरितम् ।
विसूच्यलसकौ तस्माद्भवेच्चापि विलम्बिका ॥
(Suśruta : Uttar : *56* ; 3)
and also
C. Dwarakanath : Introduction to Kāyacikitsā p. 68

[2] (i) श्लेष्मा हि स्निग्धश्लक्ष्णमृदुमधुरसारसान्द्रमन्दस्तिमितगुरुशीतविज्जलाच्छः ।
(Caraka : Vimāna : *8* ; 96)

(ii) श्लेष्मा श्वेतो गुरुः स्निग्धः
पिच्छिलः शीत एव च ।
मधुरस्त्वविदग्धः स्याद्विदग्धो
लवणः स्मृतः ॥
(Suśruta : Sūtra : *21* ; 15)

(iii) स्निग्धः शीतो गुरुर्मन्दः श्लक्ष्णो मृत्स्नः स्थिरः कफः ।
(Aṣ. Hṛ. Sūtra : *1* ; 12)

[3] (i) स्नेहो गन्धः स्थिरत्वं च गौरवं वृषता बलम् ।
क्षमा धृतिरलोभश्च कफकर्माविकारजम् ॥
(Caraka : Sūtra : *18* ; 51)

(ii) प्राकृतस्तु बलं श्लेष्मा विकृतो मल उच्यते ।
स चैवौजः स्मृतः काये स च पाप्मोपदिश्यते ॥
(Caraka : Sūtra : *17* ; 17)

(iii) सन्धिसंश्लेषणस्नेहनरोपणपूरणबलस्थैर्यकृच्छ्लेष्मा पञ्चधा प्रविभक्त उदककर्मणाऽनुग्रहं करोति ॥
(Suśruta : Sūtra : *15* ; 4)

[4] (i) × × बलं व्यायामशक्त्या × × ।
(Caraka : Vimāna : *4* ; 8)

(ii) तत्र बलेन स्थिरोपचितमांसता सर्वचेष्टास्वप्रतिघातः । and also एतत् सर्वधातुसारोपचमलक्षणेन बलेन । सर्वचेष्टास्विति कायवाङ्मनोव्यापारेषु, अप्रतिघातः अप्रतिहतत्वम् । एतत् भारहरणादिशक्तिलक्षणेन बलेन ।
(Ḍalhaṇa on Suśruta : Sūtra : *15* ; 19-20)

(iii) 'बल संचयणे' (भ्वा० आ० से०)
बल प्राणने (भ्वा० प० से०)
(Bhānujī Dīkṣita on Amarkoṣa p. 431)

The above apart, the *kapha* of the body is also stated to be responsible for contributing a cement-like material which binds together its various units. The root-meaning and definition of *śleṣmā*, which is an oft-used synonym of *kapha*, as "*Śliṣ ālingane*" i.e. 'to embrace', 'to hold together' and 'to cohere', is significant in this connection. In addition, an important aspect of *bala*, which is *kapha* based, relates to resistance to diseases, decay and degeneration of the body i.e., *Vyādhikṣamatva* which has been described in terms of (*ślaiṣmikaojas*). It is seen that this aspect of *bala* may be, inherited or *sahaja*, or determined by *kāla* (time) or *kālaja*, and induced by various therapeutic measures, especially *rasāyana* i.e., *yuktikṛta*[3] . Two aspects of *vyādhikṣamatva* have also been mentioned by Cakrapāṇi, viz. *vyādhibalavirodhitva*, meaning, opposed to the strength or virulence of disease and *vyādhyutpādakapratibandhakatva*, meaning, opposed to factors responsible for the disease.[4]

Dhātus, other than those mentioned above, have also *kapha* in their structure, with this difference that, the elemental *bhūtas* that compose them are stated to be dominantly *pṛthvī*, in the case of *asthi* and, *agni*, in the case of *rakta*, thus, conferring upon them their characteristic physical and functional peculiarities. Nonetheless, a careful study of these connective tissues would show that their basic structure is advisedly *ślaiṣmic* due to the *sthairya* quality which ensures the compactness and sturdiness of the bone and *snigdha, mṛtsnā, sāndra* and *mṛdu* qualities of *kapha* confer pliability, softness and viscosity on the *rakta dhātu*.

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[1] तत्रास्थनि स्थितो वायुः, पित्तं तु स्वेदरक्तयोः ।
श्लेष्मा शेषेषु तेनैषामाश्रयाश्रयिणां मिथः ॥
(Aṣ. Hṛ. : Sūtra : *11* ; 26)

[2] श्लेष्मा तु पञ्चधा × × ।
(Aṣ. Hṛd. : Sūtra : *12*, 12 ; 15)

and also

अवलम्बकक्लेदकबोधकतर्पकश्लेषकभेदात् पञ्चधा श्लेष्मा ।
(Hemādri on above)

[3] त्रिविधं बलमिति—सहजं कालजं युक्तिकृतं च ।
सहजं यच्छरीरसत्वयोः प्राकृतं, कालकृतमृतुविभागजं वयःकृतं च, युक्तिकृतं पुनस्तद्यदाहारचेष्टायोगजम् ।
(Caraka : Sūtra : *11* ; 36)

and also

× × योगं शब्देन रसायनप्रयोगं ग्राह्यन्ति ।
(Cakrapāṇi on above)

[4] न च सर्वाणि शरीराणि व्याधिक्षमत्वे समर्थानि भवन्ति ।
(Caraka Sūtra : *28* ; 7)

and also

व्याधिक्षमत्वं व्याधिबलविरोधत्वं व्याध्युत्पादप्रतिबन्धकत्वमिति यावत् ।
(Cakrapāṇi on the above)

A careful study of the available description of the physical qualities and physiological functions of *kapha* or *śleṣmā* in the *saṃhitā granthas* shows that, it bears a striking resemblance to the cell-protoplasm, described by modern biology. This view derives support from a study, in a cross section, of the origin of *pūya* or pus, furnished by Suśruta. Describing the inflammatory process leading to *vraṇa* (ulcer), says Suśruta, "There can be no pain without *vāta*, no *pāka* without *pitta* and no *pūya* without *kapha*."[1] In other words, like the modern description of pus as the lysed product of the protoplasm of tissues, leucocytes and bacteria, the *pūya*, according to Suśruta, is the product of the decomposition of *kapha* brought about by the *pāka* of *pitta*. It may be recalled, in this connection, that cytolytic and proteolytic enzymes of the leucocytes and bacteria, corresponding to the *pitta* of Āyurveda, cause the lysis of the protoplasm of tissues, leucocytes and bacteria and that the outcome of this action is the pus. Stated in brief, according to Suśruta, pain in the case of an inflammation is due to the *vāta* or, in other words, it is due to the tension caused by the exudate in an abcess cavity and the stimulation of the pain receptors by toxic substances present in the pus; the *pāka* i.e., transformative reactions by *pitta* and the substance subjected to the action of *pitta* being the *kapha*.

The summation below of the resemblance which *kapha* bears to protoplasm will be useful :—

(1) *Apdhātu* (the water principle) is the dominant element in *Kapha*, while *pṛthvī dhātu* (mainly solids) plays a secondary, though a significant role in its composition.[2] This parallels the composition of protoplasm, in which over 65% is water and the remaining 35% is represented by solids and gases—either in solution or suspension in the watery portion.

(2) Both the *kapha* of Āyurveda and the protoplasm of modern biology are the outcome of water and they answer to the definition of *kapha* viz. '*kena jalena phalati iti kaphah*'.

(3) Even so, both *śleṣmā* and protoplasm embrace the entire body in keeping with the definition of the former viz. '*Śliṣ-āliṅgane*'.

(4) The description of the physical characteristics of *kapha* as *snigdha, sneha, mṛtsnā, ślakṣṇa, sāndra, picchila* (*vijjala*), *sthira, mṛdu, manda, śukla, accha, guru, madhura* and *śīta*, likewise, represent the physical properties of protoplasm. In fact, modern physiology (including biochemistry) explains these properties. Thus (i) the *snigdhatva* of *kapha* corresponds

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[1] वातादृते नास्ति रुजा, न पाकः ।
पित्तादृते, नास्ति कफाच्च पूयः ॥
(Suśruta : Sūtra : *17* ; 7)

[2] अम्भः पृथिवीभ्यां श्लेष्मा ।
(Aṣ. Sam. : Sūtra : *19* ; 3)

to the viscosity of the protoplasm; (ii) its *snehatva* is explained by the presence in it of fat-protein complex and the lipids included in it. (iii) *Mṛtsnātva* of *kapha*--one of its physical qualities—resists friction. This is implicit in the foregoing two qualities which characterise the protoplasm also. (iv) *Ślakṣṇatva* refers to the smoothness of *kapha* which is also characteristic of the protoplasm. (v) *Sāndratva* refers to the density of *kapha* which has a parallel in the gel-state of the protoplasm. (vi) *Picchilatva* (*vijjalatva*) has reference to the sliminess of *kapha*. This property is also characteristic of the protoplasm, (vii) *Sthiratva* refers to the stability of *kapha*, which is also the property of the protoplasm. (viii) *Mṛdutva* of *kapha* has a bearing on its softness and pliability. Pliability is also a property of the protoplasm. (ix) *Śuklatva* (*Śvetatva*) and *acchatva* refer to the whitishness and transparency of *kapha*. These are also the properties of the protoplasm. (x) *Gurutva* of *kapha* has reference to its mass value i.e., heaviness. The protoplasm also exhibits this property. (xi) *Kapha* is stated to be *madhura* (sweetish) in taste, this quality is also exhibited by protoplasm due to carbohydrates which obtain in it, (a) as a part of its structure and (b) as one of its inclusions. And (xii) the *śītā guṇa* attributed to *kapha* is largely due to the more dominant *ap dhātu* present in it. The same is also the case with protoplasm. The temperature as may be evolved in the course of the metabolism of cells which is much less than the total body temperature evolved in a multicellular organism, cannot be appreciated by touch. When an amoeba crawls on the skin of the body or when a jelly fish is felt by the hand, the sensation of coolness is experienced. The *śītaguṇa* attributed to *kapha*, corresponding to the cool feel of protoplasm, is relative to the normal body temperature viz. 98.4°F. (xv) *Kapha*, like the protoplasm, is the basic matter-stuff of all the *dhātus* or tissues, even though its character may be considerably modified, as in the case of the protoplasm, from *dhātu* to *dhātu* (tissue to tissue), depending upon specialised functions each *dhātu* is called upon to perform. The example of *māmsa*, *medas* and *asthi* will illustrate this difference.

The functional outlook of *kapha*, comparable to that of the protoplasm of the body, can be summed up as follows:—

(I) It contributes to the growth, bulk and weight of the body—*bṛmhaṇam*, *pūraṇam* and *gauravam*.

(II) It has an inherent capacity to reproduceitself both at the cellular (*paramāṇu*) level as well as at the level of the entire animal. In the latter case, this faculty is spoken of as *vṛṣya* which relates to virility or sexual stamina and productivity.

(III) It imparts stability and durability to the body and strength to the limbs—*sthairya*.

(IV) It is held to be responsible for conferring the strength required to perform vigorous physical (manual) work i.e., *vyāyāma-śakti* on the one hand and the power to resist and overcome forces or factors which bring about disease and decay—*vyādhikṣamatva* viz., *vyādhibalavirodhatva* and *vyādhyutpāda-pratibandhakatva.*

(V) It is the factor which is responsible for the promotion of healing process—*ropaṇa.*

(VI) *Kapha*, itself, being a repository of water, makes this important fluid available to the body to subserve its vital functions, specially by its secretory activities—including the secretion of milk. It is also responsible for keeping body surfaces—both the external and internal—moist and, the articular joints and serous surfaces lubricated—*ambukarma.*

(VII) It is the factor which is responsible for the promotion of cohesion (and adhesion) of the various units and structures of the body—including joints—*śleṣaṇam* and *sandhi-bandhanam.*

(VIII) It is the basis for the exhibition of forbearance, fortitude, greedlessness, zest, knowledge and intelligence—*kṣamā, dhṛti, alobha, utsāha, Jñāna* and *buddhi.*[1]

It may be noted that all these functions are directly correlated to the protein nature of the protoplasm. Even so, a critical appraisal of the physical properties and functions of *kapha* is suggestive of its essentially protein nature.

Stated in brief, the manifold functions, ascribed by Āyurveda, to the *kapha* organisation of the body are those which modern physiology include under the activities of the skeletal, anabolic, immunological and reproductive systems. It may be mentioned, in this connection, that the *kapha* system, in the case of multicellular organisms like man, performs highly specialised functions, even though, the same organisation in an individual cell comprise, at the microscopic level, the *pitta* and *vāta* organisation also. For example, the cells of *pitta* secreting glands, though composed of *kapha*, specialise in the elaboration and secretion of *pitta*—the analogue of enzymes. The *vāta* conducting *srotāmsi*[1]—the nerve—the cells of which are also *ślaiṣmic* or protoplasmic, are highly irritable. It is obvious that they are contrived suitably for the conduction of impulses. Even so, the cells of mucus secreting glands specialise in the manufacture and supply of mucin and such other fluids—muco and glyco—proteins in nature. The observed structural difference between the structures belonging to different systems is obviously related to the specialisation of the functions which they are called upon to perform. The latter are correlated to the specific modes and variations of their structural architecture even though the matter stuff basic to these structures may, in a fundamental sense, be indentical. It may be stated, as an axiomatic truth, that structure and function are two sides of the same coin—an operational design. The structure of an object would suggest what functions it may have to perform and the function, the kind of structure that would make the particular function possible. Arising out of the foregoing, it may be said that any deficit or surfeit in the structure and function of the one system may involve the others, in a variety of ways.

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[1] Refer to p. 23 for a discussion about the *snigdhādi guṇas*-lipids—of the *Vātavaha srotāmsi*—nerves.

SECTION VI

THE GENERAL OUTLOOK OF *DOṢA-DHĀTU-MALA SIDDHĀNTA*

Tridoṣas

The concept of *vāta, pitta* and *kapha* would appear to represent a grouping of multitudinous events, which occur in the body, under three broad based headings or, in other words, they represent a broad-based generalisation of all vital activities of the body, classified under three main headings. These functions are, ultimately referable to different structures, organs, systems and substances with which the body works as an integrated whole. *Vāta, pitta* and *kapha*, representing the dynamic and static forces mutually strike a balance. In Āyurvedic phraseology, this state is described as *doṣasāmyata*, corresponding to *ārogya* (health). This equilibrium, apparently steady, is still unstable, since different kinds of stressors (*abhighāta* or trauma) either operating from within or without (*ādhyātmika, ādhibhautika and ādhidaivika*) tend to bring about an imbalance of this apparently steady-state. The disequilibrium thus engendered, known as *doṣavaiṣamya* is, in the view of Āyurveda, capable of creating a susceptibility to disease or actually inaugurate the process of disease and decay which may lead to death.[1]

Dhātus

If the general outlook of *tridoṣa* is functtional; that of *dhātus*, on the other hand, is structural. *Dhātus*, in a general sense, constitute the structural basis of the body. Since *dhātus* are susceptible to impairment, they are also known as *dūṣyas*. According to Āyurveda, seven *dhātus* have been described and a number of them are analogous to connective tissues, described by modern biology. The concept of *dhātus* has two aspects viz., (I) the formed *dhātus* or tissues inherited from parents which already exist in the body, such as blood, muscle, bone etc. as well as in the form of various organs. These are known as *sthāyī* or *poṣya dhātus*. (ii) *Poṣaka* or *asthāyī dhātus* represent the second aspect. They are the ultimate precursors of *dhātus* and outcome of *dhātvagnipāka* or intermediary metabolism, meant to be utilised by the *sthāyī* or *poṣya dhātus* in their synthesis, maintenance and energy metabolism. The *asthāyi* or *poṣaka dhātus* are constantly formed under the influence of *kāyāgni* and are utilised by the *sthāyī* or *poṣya dhātus* to meet the needs of wear and tear sustained by them in the course of life activities.[2] The relationship that is stated to exist between *doṣas* and *dhātus*, is comparable to the relationship that exists between the *sthānī* and *sthāna*, corresponding to function and structure. As stated earlier, structures and functions are mutually determining and they represent an operational design. Thus, the *sthāna* of *vāyu* is stated to be *asthidhātu*, of *pitta*, the *raktadhātu* and of *kapha*, the remaining five dhatus viz. *rasa*, *māmsa*, *medas*, *majjā* and *śukra*. Accordingly, functional disturbances may result in the impairment of the structure and *vice versa*.

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[1] (i) विकारो धातुवैषम्यं, साम्यं प्रकृतिरुच्यते ।
(Caraka : Sūtra : *9* ; 4)
(ii) रोगस्तु दोषवैषम्यं दोषसाम्यमरोगता ।
(As. Hṛd. : Sūtra : *1* ; 20)

[2] (i) यतो द्विविधो रसः—स्थायी पोषकश्चेति ।
तेन तत्र धातुपोषकपोष्यरसांशयोर्भेदविव-
क्षया भेद उक्तः ।
(Cakrapāṇi on Caraka ; Cikitsā : *15* ; 16)
(ii) धातवो रसादयो नित्यं क्षीयमाणा
अशितादिजनितधात्वाहारा एव सन्तः परं
स्वास्थ्यमनुवर्तन्ते, नान्यथेत्यर्थः ।
(Ibid Sūtra : *28* ; 3)

Malas

A reference was made above to the formation of *poṣaka* or *asthāyī dhātus*, from the nutrition ingested, in the course of *dhātvagnipāka*. This *pāka* has two aspects viz. the *prasādapāka* and *kiṭṭapāka*. The outlook of the former is anabolic and that of the latter katabolic which give rise to waste products. The waste products or *malas* are as important to the organism as *doṣas* and *dhātus* are to it. A part of *malas* may be discharged from the body at periodic intervals and, a part, utilised to subserve some of its vital functions. Thus, among them, the *doṣas*, *dhātus* and *malas* should be properly equilibriated if the normal state of functioning of the body is to be maintained. Any disturbance, in this equilibrium of these three factors may lead to abnormal states of functioning, an important feature of which is the tendency of *malas* to accumulate, instead of being discharged. It may be noted that both *doṣas* and *dhātus* are also known as *malas* in their abnormal states of functioning which also tend to be retained in the body, leading to morbid states.

In abnormal states of their functioning (1) *doṣas*, (2) *dhātus* and (3) *malas* (in the case of No 1 & 2 the related precursor substance) may tend to accumulate in their own respective *sthānas* or seats, and later, being excited by appropriate causes, they may circulate through the body and become obstructed during their passage due to the involvement of their channels of circulation viz. *srotāmsi*.[1] They may also accumulate in the locality of obstruction and react with *doṣas*, *dhātus* and *malas* of the locality and from there become channeled through pathways other than their own to cause varieties of pathological conditions or diseases or *vyādhis*.[2] In the Āyurvedic phraseology, the channels of circulation of *doṣa*, *dhātus* and *malas* are known as *srotāmsi*. The different *sthānas* of *doṣas* and those of related *dhātus*—the latter in this context, known as *śākhā*—corresponding to *sthāyī* or *poṣya dhātus*—have been described in terms of their location viz., the *rogamārgas* (disease pathways) which are three in number viz., *bāhya* or external, *madhya* or middle and *ābhyantara* or internal. The *bāhyarogamārga* or the external disease pathway, described as the *śākhā*, comprise all the *dhātus* excluding the *rasadhātu* and including the skin. The

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[1] कुपितानां हि दोषाणां शरीरे परिधावताम् ।
यत्र सङ्गः स्ववैगुण्याद्व्याधिस्तत्रोपजायते ॥
(Suśruta : Sūtra - *24*; 10)

[2] तेषां प्रकोपात् स्थानस्थाश्चव मार्गगाश्च शरीरधातवः प्रकोपमापद्यन्ते, इतरेषां प्रकोपादितराणि च । स्रोतांसि स्रोतांस्येव, धातवश्च धातूनेव प्रदूषयन्ति प्रदुष्टाः ।
(Caraka : Vimāna : *5*, 9)

madhyarogamārga or the middle pathway of disease consists of the heart, the urinary apparatus (described generally as the *basti*), joints (including the related structures such as ligaments, membranes, blood vessels etc.). The *ābhyantararogamārga* or the internal disease pathway compose the *koṣṭha* or the gastro-intestinal tract.[1] The main purpose of the *pañcakarma* therapy, preceded by the *pūrva* or pre-*snehasvedādi* and followed by *paścāt* or post (*samsarjanakrama*) measures is to bring the accumulated *malas* from the *śākhās* to the *koṣṭha* and eliminate them from there through the one or the other of the passages, by *vamana* (emesis), *virecana* (purgation) etc.[2]

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[1] त्रयो रोगमार्गा इति-शाखा, मर्मास्थिसन्धयः कोष्ठश्च। तत्र शाखा रक्तादयो धातवस्त्वक् च स बाह्यो रोगमार्गः; मर्माणि पुनर्बस्तिहृदयमूर्धादीनि, अस्थिसन्धयोऽस्थिसंयोगास्तत्रोपनिबद्धाश्च स्नायुकण्डराः, स मध्यमो रोगमार्गः; कोष्ठः पुनरच्यते महास्रोतः शरीरमध्यं महानिम्नमामपक्वाशयश्चेति पर्यायशब्दैस्तन्त्रे, स रोगमार्ग आभ्यन्तरः। (Caraka : Sūtra : *11*; 48)

[2] (i) स्नेहक्लिन्ना धातुसंस्थाश्च दोषाः स्वस्थानस्था
ये च मार्गेषु लीनाः सम्यक् स्वेदैर्योजितैस्ते
द्रवत्वं प्राप्ताः कोष्ठं शोधनैर्यान्त्यशेषम्।
(Suśruta : Cik. : *32*; 21)

(ii) स्नेहस्वेदप्रचलिता रसैः स्निग्धैरुदीरिताः।
दोषाः कोष्ठगता जन्तोः सुखा हर्तुं विशोधनैः॥
(Suśruta : Cik. : *33*; 47)

Chapter Three

MODUS OPERANDI OF THE DEVELOPMENT OF DISEASE PROCESS VIS-A-VIS *PAÑCAKARMA* THERAPY

SECTION I

IMPORTANCE OF *AGNI* IN DISEASE CAUSATION

According to Āyurveda, the body in its entirety—structural and functional—is an outcome of nutrition, the utilisation of which latter is again stated to be dependent on *agni*, as can be seen from following citations :

"The body is the outcome of nutrition ; diseases arise as a direct consequence of nutritional errors ; the distinction between *sukha* or health and *duhkha* or disease is the difference between the wholesome or unwholesome nutrition"[1]. The manner and conditions in which the nutrition ingested, contributes to the well being of the human organism have been described as hereunder :

"Wholesome food ingested in fourfold manner viz., eaten, drunk, licked and masticated, having been digested by *antaragni* and followed by further *pāka* by *bhūtagni* which latter have been duly activated (ignited) previously by *jaṭharāgni*, are again subjected to further *pākas* by *dhātvagni*, subject to the condition that *dhātūṣmā*, *srotāmsi* and *māruta* are not impaired, *dhātupāka* (metabolic processes) are proceeded with, like the inexorable *kāla* (time). *Āhārdhātus*, thus prepared, confer upon the organism vitality, promote the complexion, happiness and longevity and, provide energy to *dhātus*. Nutrition obtained from food sources are the nutrition for *sārīra-dhātus* as these contribute to the maintenance of the normalcy of *dhātus*"[2]

That, in the final analysis, it is the state of *agnī* that determines positive health and its concomitants, is seen from the following which also draws attention to the fact that the impairment of this factor leads either to susceptibility for diseases or the extinction of the human organism.

"The *dehāgni* (*jaṭharāgni*) has been stated to be responsible for the expectancy of life, complexion, vitality, positive health, enthusiasm, suppleness, glow and *ojas*.[1],[2] Man ceases to exist when *agni* is extinguished; if, on the other hand, it is functioning properly, the man lives long and in good health. He is rendered susceptible to diseases when his *agni* is impaired. Hence it has been stated that *agni* is the basis of life".[3]

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[1] आहारसंभवं वस्तु रोगाश्चाहारसंभवाः ।
हिताहितविशेषाच्च विशेषः सुखदुःखयोः ॥
(Caraka : Sūtra : *28* ; 45)
and also
× × × संग्रहे वस्त्वित्ति शरीरम् ।
(Cakrapāṇi on the above)

[2] विविधमशितं पीतं लीढं खादितं जन्तोर्हितमन्तरग्निसन्धुक्षितबलेन यथास्वेनोष्मणा सम्यग्विपच्यमानं कालवदनवस्थितसर्वधातुपाकमनुपहतसर्वधातूष्ममारुतस्रोतः केवलं शरीरमुपचयबलवर्णसुखायुषा योजयति शरीरधातूनूर्जयति च । धातवो हि धात्वाहाराः प्रकृतिमनुवर्तन्ते ।
(Caraka : Sūtra : *28* ; 3)
and also
यथास्वेनोष्मणेति पार्थिवाग्न्यादि रूपः × ×
धातवो रसादयो नित्यं क्षीयमाणा अशितादिजनितधात्वाहारा एव सन्तः परं स्वास्थ्यमनुवर्तन्ते नान्यथेत्यर्थः । (Cakrapāṇi on the above)

It would seem that one of the criteria of positive health is, among others, the same or normal state of functioning of *agni*, and that, disease-free state is characterised by pleasure and, in the reverse direction, the abnormal states of functioning of the body, corresponds to pain, is seen postulated in the following citations :

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[1] The concept of *ojas* is a complex one. It, obivously refers to a factor or a factor-complex responsible for affording protection to the body against disease, decay and degeneration. It is seen from available discreptions that *ojas* is an outcome of *dhātvagni-pāka* (inter mediary metabolism) and (a final) formed element to the formation of which, each one of the seven *asthāyidhātus* are said to contribute (*a*). Two kinds of *ojas* have been envisaged viz., *ślaiṣmika ojas* and *aṣṭabindu-ojas* corresponding to *aparā* and *parā ojas*. In our academic discussions in the Department of *Kāyacikitsā*, (Post Graduate-Training Centre, Jamnagar) all the implications of *ślaiṣmika ojas* were carefully examined and a complete reorientation of it was made. Some of the more recent researches in non-specific immunity against microbial and non-microbial diseases, carried out by the immuno-chemist Louis Pillemar and coworkers at the Pathology Institute, Western Reserve University, Cleveland, Ohio, U.S.A., have thrown more light on this problem. The outcome of these researches was the discovery of a complex protein known as Properdin, which, like *ślaiṣmika ojas*, described in *Āyurveda*, appears to be responsible for conferring innate resistance against a variety of diseases, infective or otherwise. This subject is fully considered in the, Introduction to Kāyachikitsā by Prof. C. Dwarakanath.

(a) तत्र रसादीनां शुक्रान्तानां धातूनां यत् परं तेजस्तत् खल्वोजस्तदेव बलमित्युच्यते, स्वशास्त्रसिद्धान्तात् ।

(Suśruta : Sūtra : *15*,19).

(b) यदुक्तं तन्त्रान्तरे-"प्राणाश्रयस्यौजसोऽष्टौ बिन्दवो हृदयाश्रयाः" इति । एतच्चाष्टबिन्दुकं परमोजो ज्ञेयम् । अर्धाञ्जलिपरिमाणं तु यदोजस्तदप्रधानं, यच्छारीरे वक्ष्यति–"तावच्चैव श्लैष्मिकस्यौजसः प्रमाणम्" (शा० अ० 7) इत्यनेन; तस्माद्विविधमिहौजः ।

(Cakrapāṇi on Caraka; Sūtra: *17*; 73-75)

[2] The term *tejah* pertains, among others, to body-heat and *śukra* (Cakrapāṇi). It would seem that, in this context, it refers to the latter, as the former has been covered by the term *agni*, which follows immediately after the term *tejah*. and also

तेजः देहोष्मा शुक्रं वा ।

(Cakrapāṇi on Caraka : Cikit. : *15*; 3-4)

[3] आयुर्वर्णो बलं स्वास्थ्यमुत्साहोपचयौ प्रभा ।
ओजस्तेजोऽग्नयः प्राणाश्चोक्ता देहाग्निहेतुकाः ॥
शान्तेऽग्नौ म्रियते युक्ते चिरं जीवत्यनामयः ।
रोगी स्याद्विकृते मूलमग्निस्तस्मान्निरुच्यते ॥

(Caraka : Cikit. : *15*; 3-4)

"A healthy individual has been defined as a person in whom the *doṣa* triad is in state of equilibrium ; whose *agni* is in same state, whose *dhātus* and *malas*, perform their normal functions and whose *ātmā*, *indriyas* and *manas* are clear and tranquil".[1]

"*Ārogya* is the state in which *dhātus*[2] are in their normal states of functioning and, disease represents their impairment. The former state is characterised by a sense of ease and pleasure whereas, the latter is always in the nature of pain[3] (disease)".

It has been stated, as an axiomatic truth, that the origin of different kinds of diseases can be traced to *agnidoṣa* (the impairment of *agni*) and the consequent accumulation of *malas*. This has been emphasised in the following citations :

"Different kinds of diseases occur, in man, due to *agnidoṣa* and a corresponding increase of *malas*.[4]

"Generally speaking, many diseases have their origin in *mandāgni* and, in special, the occurrence of *udararogas*".[5]

The emphasis laid by Caraka on the need to protect *agni* and eliminate causes which may impair it, especially in the context of the excitation of *doṣas* or their alleviation is significant. Caraka's observation in this regard runs as follows :

"The alleviation and excitation of all *doṣas* depend on the state of *agni*.[6] Therefore, effort should always be made to protect the *agni* and eliminate the causes which may disturb it".[7]

The *samhitā granthas* are replete with many such postulations but, the foregoing, would suffice to emphasise the following facts :

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[1] समदोषः समाग्निश्च समधातुमलक्रियः ।
प्रसन्नात्मेन्द्रियमनाः स्वस्थ इत्यभिधीयते ॥
(Suśruta : Sūtra : *15*, 43)

[2] The term *dhātu* refers, in this context, to *doṣas*, *dhātus* and *malas* and it has been used here collectively to indicate their supporting nature in their normal states of functioning.

[3] विकारो धातुवैषम्यं साम्यं प्रकृतिरुच्यते ।
सुखसंज्ञकमारोग्यं, विकारो दुःखमेव च ॥
(Caraka : Sūtra : *9* ; 4)

[4] अग्निदोषान्मनुष्याणां रोगसङ्घाः पृथग्विधाः ।
मलवृद्ध्या प्रवर्तन्ते × × × ॥
(Caraka : Cikit. : *13* ; 9)

[5] रोगाः सर्वेऽपि मन्देऽग्नौ सुतरामुदराणि तु ।
(As. Hṛd. : Nidāna : *12* ; 1)

[6] (i) Four states of *agni* have been described in the *Āyurvedic* classics. They are *viṣamāgni* (irregular or erratic functioning of *agni*), *tīkṣṇāgni* (hyperactivity of *agni*), *mandāgni* (hypo functioning of *agni*) and *samāgni* (the normal state of functioning of *agni*).

(ii) तैर्भवेद्विषमस्तीक्ष्णो मन्दश्चाग्निः समैः समः ।
(As. Hṛd. : Sūtra : *1* ; 8)

[7] शमप्रकोपौ दोषाणां सर्वेषामग्निसंश्रितौ ।
तस्मादग्निं सदा रक्षेन्निदानानि च वर्जयेत् ॥
(Caraka : Cikit : *5*, 136)

(1) The proper functioning of the body, in all its different aspects, depends entirely upon the quality and quantity of nutrition ingested.

(2) The utilisation of the nutrition depends primarily, on the state of *agni*.

(3) When nutrition is properly utilised, that is to say, digested and metabolised, then its distribution to different parts of the body is determined by the functional and structural states of *srotāṁsi* which are the conducting channels and *māruta*, the motive force, is responsible not only for ensuring the movement of nutrition throughout the body but also for determining the integrity of the channels of distribution.

(4) An important criterion of health is, among others, seen to be directly correlated to normal states of functioning of *agni* which is stated to ensure positive health, corresponding to pleasure, whereas, the reverse is signified by disease.

5) The impairment of *agni* results in an all round impairment of the functional and structural aspects of the body and this is stated to be due to an accumulation of waste-products or *malas* in the body, instead of normal metabolic events.[1]

6) The proper functioning of the *doṣas* depend on the normal state of functioning of *agni*. In attempts to alleviate or palliate the excited *doṣas*, care must be taken to maintain the *agni* in its normal state of functioning.

Agni would, therefore, appear to be the factor which may bring about the impairment of *doṣas*, *dhātus* and *malas*, leading to their new *mala*[2]) accumulation (*malasañcaya*) instead of being eliminated, as in normal course of events.

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[1] The term normal metabolic events refers here to intermediary and energy metabolism. The former has been described as "Changes which may take place between the moment of the entry of a nutrient into the organism and the moment of discharge of ultimate chemical products into the environment" (Abraham White *et al*: Principles of Biochemistry: Mc Graw Hill, New York, Publication, 1954 Edition p. 287.

[2] Apart from waste-products that are formed during the normal course of functioning of the body which are known as *malas* or effete-substances, *doṣas*, and *dhātus* have also been described as *malas* in their abnormal states of functioning. (Vide Ref. p. 15 Foot note No. 4) It has been also stated that during the course of *avasthā pāka*, a number of waste products are formed and that, these, including *vāta*, *pitta*, *kapha* (*mala rūpa*) coresponding, obviously, to gases produced during oxidative reactions viz., (i) carbonic acid, carbon di-oxide, (ii) bile salts and pigments and (iii) mucoid secretions, including nitrogenous non-protein substances. Like urea waste-products, corresponding to each *dhātu*, are also stated to result in this *pāka*, some of which are utilised for the synthesis of such structures as hair of the body, nails, etc. and, a part, contributed to the formation of urine, faeces, sweat, discharges from the nose, mouth, eyes, ear etc. (Caraka: Sūtra: *28*; 4). From this point of view, the accumulation of *doṣas*, in abnormal states of their functioning, mentioned here, may probably refer to their bi-products, which in the normal course of events, should have been utilised by or eliminated from the body.

SECTION II

THE ROLE OF *ĀMA* IN DISEASES

The positive role played by *agni* in normal physiological states has been discussed in the foregoing and emphasis was laid on *pācakāgni* (pitta). This *agni* was shown to permeate through all metabolising structures of the body and how *grahaṇī*-located *pācakapitta* is correlated to its moieties contributed to *dhātus*. It will follow, from the above as a logical corollary, that the dysfunction of the one or the other, leading not only to different kinds of digestive disorders but also to metabolic disturbances. This idea has been described in the concept of *āmadoṣa* (and *āmaviṣa*) which would appear to form the general basis of the Āyurvedic concept of pathogenesis.

The term *āma* when literally translated means unripe, uncooked, immature and undigested. In Āyurvedic parlance, it has reference to substances which are formed in the course of digestive process and metabolic events due to impairment of *kāyāgni*. Several descriptions of *āma* are furnished in the Āyurvedic classics but the more important ones are presented hereunder, with a view to amplify the concept.

According to Vāgbhaṭa, the first *dhātu* viz., *rasa* is not properly formed due to *alpabala* (reduced strength) of *uṣmā* (*agni*). In this condition the *anna rasa* (chyle) is rendered as *duṣṭa*[1] due to retention of it in the *āmāśaya* when, it is known as *āma.*[2] He has quoted authorities, according to whom, the disturbed *vātādidoṣās*, commingling with each other, lead to the formation of *āmadoṣa*, very much like the production of *viṣa* (poisonous or toxic substances) from the spoilt or decomposed *kodrava.*[3]

The implications of the latter description would appear to refer to the occurance of toxic substances from food, due to the failure of *agni* and stasis of food in the digestive tract and its decomposition and/or putrefaction.

The other views held on this subject are presented below:

(i) "The term *annajarasa* mcns *āma.* If *annarasa* is not properly digested and formed, an outcome of such a digestion is known as *āma*".[4]

(ii) "In the view of some, due to the impairment of the *kāyāgni*, *annarasa* is not properly formed in the *amāśaya* and, in this state, it is known as *āma*".[5]

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[1] This term has a reference to fermentative and putrefactive changes as may occur during indigestion.

[2] ऊष्मणोऽल्पबलत्वेन धातुमाद्यमपाचितम् ।
दुष्टमामाशयगतं रसमामं प्रचक्षते ॥
(Aṣ. Hṛ. Sūtra : *13*; 25)

[3] अन्ये दोषेभ्य एवातिदुष्टेभ्योऽन्योन्यमूर्च्छनात् ।
कोद्रवेभ्यो विषस्येव वदन्त्यामस्य सम्भवम् ॥
(Aṣ. Hṛ. Sūtra *13*: ; 26)

[4] सोऽन्नजो रस इति आमः, अन्नरसस्यैवापक्वस्य तन्त्रान्तरे आमव्यपदेशात् ।
(Vijayarakṣita on Āmavāta in Mādhava Nidāna)

[5] आमाशयस्थः कायाग्नेर्दौर्बल्यादविपाचितः ।
आद्य आहारधातुर्यः स आम इति संज्ञितः ॥
(Quoted by Cakrapāṇi on Caraka : Cik : *15*; 93).

(iii) "There are others who hold that the undigested *annarasa*, possessing *daurgandhyam* (foul odour) and *bahupicchilatvam* (excessive pastiness) deprives the body of its nutrition and, in consequences, causes *sādana*. This is known as *āma*."[1]

(iv) Some hold the view that, if due to the poor strength of *jāṭharāgni*, a residue of *āhārarasa* (chyle) is still left behind undigested towards the end of digestion, it is then known as the *āma* which is the root cause of all diseases.[2]

(v) The view that food which is not properly digested is *āma* is held by some. Yet, others describe the accumulation of *mala* (waste products) in the body as *āma*.[3]

(vi) There is also the view that the first stage or phase of *doṣaduṣṭi* is *āma*.[4]

As regards *sāma*, Vāgbhaṭa describes it as a condition in which the *tridoṣa* and *saptadhātus*, as well as *malas*, become permeated with the *āma* produced in the *āmāśaya*. Diseases which arise, in consequence, are also spoken as the *sāma* type of diseases.[5]

The aetiology of *āmadoṣa* and *āmaviṣa* are many and varied. They range from the physical to the mental and include the following:—

(1) Abstinence from food.
(2) Indigestion
(3) Over eating
(4) Irregular eating
(5) Ingestion of:—
    (*a*) Unwholesome food
    (*b*) Heavy or indigestible food
    (*c*) Too cold and stale food
    (*d*) Excessively dry and dehydrated food
    (*e*) Putrid articles.
(6) Adverse effects of therapeutic measures such as:—
    (*a*) *Virecana* (Purgation)
    (*b*) *Vamana* (Emesis)
    (*c*) *Sneha* (Oleation).
(7) Emaciation or wasting brought about by other diseases.
(8) Incompatibility of:—
    (*a*) *Doṣa* (Country)
    (*b*) *Kāla* (Climate)
    (*c*) *Ṛtu* (Season).
(9) Volitional inhibition of natural urges.

The outcome of the operation of these aetiological factors is stated to lead to *agniduṣṭi* which may lead to the manifestation of severely acute gastro-intestinal disorders, classified under different varieties of *ajīrṇa* such as *āmājīrṇa, vidagdhājīrṇa, viṣṭabdhājīrṇa, rasaśeṣājīrṇa.*[1]

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[1] अपरे त्वाहुः–अविपक्वमसंयुक्तं दुर्गन्धं बहुपिच्छिलम् ।
सदनं सर्वगात्राणामाम इत्यभिधीयते ।।
(Vijayarakṣita on Āmavāta in Mādhava Nidāna).

[2] अन्येत्वाहुः–आहारस्य रसः शेषो यो न पक्वोऽग्निलाघवात्।
स मूलं सर्वरोगाणामाम इत्यभिधीयते ।।
(Ibid)

[3] आममन्नरसं केचित् केचित्तु मलसंचयम् ।
(Cakrapāṇi on Carak : Cik : *15*; 93).

[4] प्रथमां दोषदुष्टिं च केचिदामं प्रचक्षते ।
(Ibid)

[5] आमेन तेन सम्पृक्ता दोषा दूष्याश्च दूषिताः । सामा
इत्युपदिश्यन्ते ये च रोगास्तदुद्भवाः ।
(Aṣ. Hṛ : *13*; 29

The more important and, perhaps a significant feature of *āmadoṣa* or *āmaviṣa* relates, as could be seen from the classical description of changes which the food is stated to undergo when *agni* is *manda*. The use of such terms as *śuktapāka*,[2] *daurgandhya*[3] and *bahupicchilatvam*,[4] in this context, need an appraisal.

The term *śuktatvam* pertains to fermentative changes and *daurgandhya* or foul smell is due to the manifestation of putrefactive changes. The former relate to the *madhura* or sweet components of food, corresponding to carbohydrates and the latter to those components of food from which *śleṣmā* is derived. The physical qualities of such substances are *picchila* and *prakledi*, corresponding to the description of proteins.[5] *Picchilatva* or sliminess and viscosity are, generally, attributed to protein colloids,[6] even though, these properties may also be exhibited by sugars. It is a well known phenomenon, that sugars undergo fermentation under the influence of *kiṇva* or enzymes (ferments)—usually bacterial products, whereas proteins undergo putrefaction under the influence of bacterial activity, yielding in the process, various bi-products of protein break down, generally foul smelling (*daurgandhyam*) and slimy (*picchilam*). The implications of such changes in the *āmāśaya*, corresponding to the stomach and small intestines, in contrast to *pakvāśaya* or large intestine, is significant in that it has also been shown that the former is not so well protected as the latter in the matter of resistance to the passage of toxic substances into the blood stream. In other words, the biproducts of fermentative or putrefactive changes, especially the latter, are absorbed from the small intestine, leading to various acute systematic disturbances, including the metabolic. These may, if neglected, lead on to chronic or subacute states. They may form toxic substances that are generally viscous.

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[1] (१) अभोजनादजीर्णातिभोजनाद्विषमाशनात् ।
असात्म्यगुरुशीतातिरूक्षसंदुष्टभोजनात् ॥
विरेकवमनस्नेहविभ्रमाद्व्याधिकर्षणात् ।
देशकालर्तुवैषम्याद्वेगानां च विधारणात् ॥
दुष्यत्यग्निः × × × × × ।
(Carka : Cik : *15;* 42-44)

(२) शुक्तत्वमिति अम्लताम् । विषरूपतामिति यथा विषं बहुविकारकारि भवति तथा तद्रूपताम्, अनेन सर्व एव अजीर्णभेदा अवरुद्धा ज्ञेयाः, ये तन्त्रान्तरे आमं, विदग्धं विष्टब्धं कफपित्तानिलैः क्रमात् । अजीर्णं केचिदिच्छन्ति चतुर्थं रसशेषतः" (सु० सू० अ० ४६) इत्यनेनोक्ताः ॥
(Cakrapāṇi on above)

[2] × × स दुष्टोऽन्नं न तत् पचति लघ्वपि ।
अपच्यमानं शुक्तत्वं यात्यन्नं विषरूपताम् ॥
(Caraka : Cik : *15;* 44)

[3] & [4] refer to p. 58, footnote No. 1.

[5] माधुर्यात् पिच्छिलत्वाच्च प्रक्लेदित्वात्तथव च ।
आमाशये संभवति श्लेष्मा मधुरशीतलः ॥
(Suśruta : Sūtra : *21*; 13)

[6] "Colloids are usually, though not always, amorphous and in water, frequently form viscous solutions, However, the real criterion of the colloidal state is that, particles are so much larger than molecules that they possess surface, yet not so large as to settle out easily by the action of gravity."

(Bodansky : Introduction to Physical Chemistry p. 20th IV, Edition).

The description of *āmadoṣa* and *āmaviṣa*, referred to above, will be clarified by taking note of the mention Caraka[1] has made of *sahaja kṛmis* which inhabit the body and Cakrapāṇi's characterisation of them as non-pathogenic or *avaikārika*.[2] Here is a tacit recognition of the existence of a large bacterial population that inhabit the body and which, normally, do not cause any abnormal states. The question as to what part these *avaikārika sahaja kṛmis* (non-pathogenic organisms) play in the total scheme of life may have to be raised and an answer found. If they do not contribute to diseases, do they at least, help the host in any way—symbiotic, mutualistic or obligatory or are they indifferent and still, manage to secure their pabulum from either the host's nutrition—parasitic or his waste products—saprohytic ? Recent developments in the fields of microbiology and physiology, however, provide answers to these questions and they have an immediate bearing on *āmadoṣa* or *āmaviṣa*. According to these developments, intestines—small and large—are inhabited by a large bacterial population. Under normal conditions, the stomach does not allow bacteria to thrive in it. This has been shown to be due to the hydrochloric acid an *āgneya dravya*—present in this organ. Microbes which enter the body together with foods and drinks are destroyed by it. Some of them may still manage to survive and these are swept into the intestine and they usually find an asylum in the large intestine where conditions are more propitious for their survival. It has also been shown that the bacterial population of the small intestine are different from that of the large and, their functions are also different, in that, the inhabitants of the former locality perform fermentative action, whereas, the latter, putrefactive and proteolytic. A condition for the survival of the population of small intestine is seen to be the continued supply of adequate quantity of *madhura dravyas* (carbohydrates). They are seen to need an acid environment which is furnished by the fermentation of sugars into lactic acid. This environment has been shown to be unfavourable to the population of the large intestine.

The microbial population of the large intestine are mainly responsible for the breakdown of the *āhārakiṭṭa*, resulting in the production of pungent and disagreably smelling gases that arise out of the putrefaction of proteins, in this locality. Highly toxic substances are formed, by some of the microbes of the large intestine but the immunity this part of alimentary tract possesses, prevents serious consequence. The reverse is true in the case of small intestine from where toxic absorption can easily take place.

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[1] अथास्मै प्रोवाच भगवानात्रेयः–इह् खल्वग्निवेशः विंशतिविधाः क्रिमयः पूर्वमुद्दिष्टा नानाविधानेन प्रविभागेनान्यत्र सहजेभ्यः ।

(Caraka : Vimāna : 7; 9)

[2] अन्यत्र सहजेभ्य इत्यनेन शरीरसहजास्त्ववैकारिकाः क्रिमयो विंशतेरप्यधिका भवन्तीति दर्शयति ।

(Cakrapāṇi on Caraka : Vimāna : 7; 9)

If, it is accepted that the *sahaja* (or (*avaikārika*) *kṛmis* in the *āmāśaya* and *pakvāśaya* also contribute to the normal digestive functions which involve fermentation and putrefaction, each in its own place, subject to the condition that the functioning of *pācakāgni* is normal, the reverse position engendered by *agnidvṣṭi* can be logically expected to create an intestinal climate which may make for abnormal activities of the *sahaja kṛmis* leading to fermentation and putrefaction of food substances which remain undigested due to the lack of necessary digestive juices. It has been shown that, under certain circumstances, the normal intestinal flora may cross the intestinal barrier into the blood stream—the intestinal mucosa becoming permeable to them can cause bacteraemia.

Chopra *et al*, in their reference to experiments carried out on the effects of temperature and humidity on resistance to gastro-intestinal infection, have observed that "Atonia and stasis, gastric acidity, the activities of bacterial flora and variations in pH of facces occur." They have also referred to recorded experiments as regards the effects of temperature and humidity on the resistance to the gastro-intestinal infection, which have shown that "High temperature associated with high humidity favoured the passage of infecting organism across the gastro-duodenal barrier and increased the premeability of the intestine so that the bacteria could pass into the lymphatics and finally reduced the defence of the animal to such an extent that the severity of infection was enhanced".[1]

Mere *agnidvṣṭi* would only result in the non-digestion of the food ingested but, the production of viṣa or toxic substances may need some agency which will bring about the splitting of *āhāradravyas* in a manner different from *pācakāgni*. The absorption of the products of such splitting and the symptoms produced thereby, bear a strong resemblance to the symptomatology of *āmaviṣa*. The seriousness of *āmadoṣa* has been characterised by Caraka as follows:—"Physicians have described *āmadoṣa* as *āmaviṣa* as it exhibits symptoms similar to those of *viṣa* and, *viṣa* is antagonistic to health".[2] Vāgbhaṭa has gone a step further in advising physicians to avoid undertaking the treatment of *āmaviṣa* which, in his view, is intensely toxic, capable of endangering life and is of fatal prognosis.[3]

The seriousness of *āmaviṣa* can easily be imagined by visualising a situation in which, due to *agniduṣṭi*, the *sahajakṛmis* of the *pakvāśaya* (large intestine) cross the ileocaecal barrier and proceed to act upon the undigested food present in this locality, producing deamination of proteins, leading to the production of ammonia, ketoacids and decarboxylation with the production of carbon-di-oxide and pharmacologically active amines such as tyramine and histamine, among others, in addition to the invasion of the blood stream by the intestinal flora by crossing the intestinal barrier the permeability of which may be increased and selectivity impaired. The condition thus created, will amount, not only to bacteriemia but also to toxaemia, to deserve the term *viṣa* with all its implications.

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[1] Chopra *et al.*: Tropical Therapeutics pp. 147-154, 2nd Edition.

[2] विरुद्धाध्यशनाजीर्णाशनशीलिन: पुनरामदोषमामविषमित्याचक्षते भिषजो, विषसदृशलिङ्गत्वात् । तत् परमसाध्यमाशुकारित्वाद् विरुद्धोपक्रमत्वाच्चेति ।

(Caraka : Vimāna : *2*; 15)

[3] विरुद्धाध्यशनाजोर्णशीलिनो विषलक्षणम् ।
आमदोषं महाघोरं वर्जयेद्विषसंज्ञकम् ।।
विषरूपमाशुकारित्वाद्विरुद्धोपक्रमत्वत: ।

(Aṣ. Hṛ : Sūtra : *8*; 4)

The description of *āmaviṣa* above represents an extreme situation but, then, in many cases of dietetic indiscretions, nutritional errors and other stresses *ādhibhautika* (environmental—physical), *ādhyātmika* (somatic ond psychic) and *ādhidaivika* (meteorological and other crisis which are beyond human control) may not, in every case, produce situations comparable to *āmaviṣa*. Many among such cases are seen to recover, invariably, after the offending material has been eliminated by either vomiting or purgation or both. On the other hand, as stated by Caraka, overeating need not, in every case, result in *āmadoṣa*. Other causes such as, untimely eating, foods and drinks that are heavy or are indigestible, dry, too cold, dehydrated, the use of a food for which one has aversion or dislike, foods that may cause distentsion of gastro-intestinal tract, the consumption of unclean and contamination (infected) and incompatible foods, as well as emotional stress situations such as *kāma* (libidinal impulse), *krodha* (rage) *lobha* (greed), *moha* (infatuation), *īrṣyā* (envy), *hrī* (*shame*), *śoka* (grief), *māna* (indignation), *udvega* (anxiety) and *bhaya* (fear) may give rise to *āmadoṣa*.[1] It is also seen that the neglect of proper treatment of other diseases of *koṣṭha* (gastro-intestinal tract) such as *atisāra* (diarrhoea) *pravāhika* (dysenteries) etc., may lead to persistent *āma* state, the impairment of *grahaṇī*, *grahaṇīdoṣa* which, in turn, may become the cause of *grahaṇīroga*[2] (sprue like or malabsorption syndrome) or varieties of other disease, such as *udara rogas* viz, *yakṛtdālyudara* (liver damage and hepatic diseases), *jalodara* (ascites), *śotha* (edema), *pāṇḍu* (anaemia), *prameha* (polyurea—diabetes mellitus, in particular), *āmavāta* (rheumatism) etc. In fact, in this view, diseases included under *kāyacikitsā* are stated to be the outcome of *āmadoṣa*. Many among them may assume a subacute or chronic states due to primary gastro-intestinal disturbances correlated to metabolic abnormalities as may occur in a kind of chain sequence. It may be noted that in the classical Āyurvedic view, *āma* is stated to produce its own characteristic symptoms in the very part where it is located and such conditions are to be understood with reference to the particular *doṣa* involved by the characteristic symptoms manifested in this state.[1] To the above, may be added that *āma* may involve more than one *doṣa* i.e. (*saṃsarga*) and three (*sannipāta*) and exhibit symptoms characteristic of them.[2]

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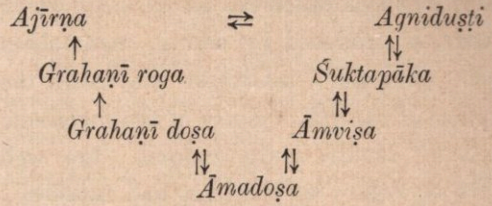
[1] न च खलु केवलमतिमात्रमेवाहारराशिमामप्रदोषकरमिच्छन्ति, अपि तु खलु गुरुरूक्षशीतशुष्कद्विष्टविष्टम्भिविदाह्यशुचिविरुद्धानामकाले चान्नपानानामुपसेवनम् । कामक्रोधलोभमोहेर्ष्याह्रीशोकमानोद्वेगभयोपतप्तमनसा वा यदन्नपानमुपयुज्यते, तदप्याममेव प्रदूषयति ।
(Caraka : Vimāna : *2*; 8)

[2] अतिसारे निवृत्तेऽपि मन्दाग्नेरहिताशिनः ।
भूयः संदूषितो वह्निर्ग्रहणीमभिदूषयेत् ।।
एकैकशः सर्वशश्च दोषैरत्यर्थमूर्च्छितैः ।
सा दुष्टा बहुशो भुक्तमाममेव विमुञ्चति ।।
पक्वं वा सरुजं पूति मुहुर्बद्धं मुहुर्द्रवम् ।
ग्रहणीरोगमाहुस्तमायुर्वेदविदो जनाः ।।

The states in which *doṣas, dhātus* and *malas* are permeated with *āma* has been described elsewhere as *sāma*. The symptomatology presented in such states include *balabhraṁśa* (loss of strength), *gaurava* (feeling of heaviness of the body), *anilamuḍhatā* (obstruction to the passage of *vāyu*), *ālasya* (lassitude), *apakti* (indigestion), *niṣṭhīva* (excessive salivation), *malasanga* (constipation), *aruci* (annorexia) and *klama* (discomfort). These are indicative of an accumulation of *āmajanya doṣas* i.e. *sāma doṣas*—in the body due to the obstruction of circulatory channels (*srotāmsi*).[3]

The sequence of events that may follow in the wake of *ajīrṇa*, when neglected and the causative ætiological factors not corrected in proper time may, in course of time, lead on to a kind of vicious circle sequence, as represensed in the schema below:—

Viscious circle—Viṣa Cakram



It may also be noted that, many acute diseases viz. *jvara* (fever), *atisāra* (gastro-enteritis) etc., pass through the state of *āma*. If they are properly treated, they go through the second and third stages viz. *pacyamāna* and *nirāma avasthā*—resulting in the onset of recovery. If, on the other hand, the acute condition is not resolved in time and it is allowed to pass on to subacute or chronic state, *āmāvasthā* is stated to still persist. These *avasthās* (states) usually serve as the ætiology of other diseases, described in Āyurveda, as *nidānārthakara rogas.*[4]

In passing, a reference may perhaps be made to metabolic histo-toxic-anoxia, described in modern medicine which, in certain respects, parallels the idea underlying acute, subacute and chronic *āma* states, corresponding to the description of *mala-samcaya*, in the *śakhās*. This phenomenon, which relates to the inability of tissues to utilise molecular oxygen brought to them or increased oxygen needed by them due to cell-intoxication which in turn, is produced by certain metabolites which, obviously, inhibit or inactivate the enzymes of the cells. Some of the metabolic effects of severe acute annoxia "are well known in regard to the liver and muscles". In these structures, the breakdown of the primary food stuff, carbohydrates, normally proceeds anaerobically (i.e. without oxidation) to the stage of the formation of pyruvic acid. Further oxidation of pyruvate requires the availability of oxygen and, when this is deficient, the breakdown is impaired and proportion of pyruvate become reduced to lactic acid which cannot be further broken down anaerobically. Hence, there is an increase in the blood lactate, with decrease in bicarbonate and a corresponding acidosis. As, under these circumstances, the total energy obtained from food-stuff breakdown is greatly reduced, the amount of energy available for continuing resynthesis of energy-rich phosphate compounds becomes inadequate. As the breakdown of the latter substances is the immediate source of energy during the myriad of anabolic reactions occuring in tissues, such deficiency of energy-rich phosphate compounds produces a complex disturbance of cellular function, which at present, is poorly understood. Whether the more subtle effects of mild anoxia, for example, on the central nervous system are mediated through lesser degrees of such disordered metabolism, remains to be demonstrated.[1]

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[1] यत्रस्थमामं विरुजेत्तमेव देशं विशेषेण विकारजातैः ।
दोषेण येनाववतं स्वलिङ्गैस्तं लक्षयेदामसमुद्भवैश्च ।।
(Suśrut : Uttara : *56* ; 10)

[2] तत् त्रिकं सन्निपातमाचक्षते द्वयं वा संसर्गम् ।
(Caraka : Vimāna : *6* ; 11)

[3] स्रोतोरोधवलभ्रंशगौरवानिलमूढ़ताः ।
आलस्यापक्तिनिष्ठीवमलसङ्गारुचिक्लमाः ।
लिङ्गं मलानां सामानां निरामाणां विपर्ययः ।
(Aṣ. Hṛ : Sūtra : *13* ; 23-24)

[4] निदानार्थकरो रोगो रोगस्याप्युपलभ्यते ।
तद्यथा ज्वरसंतापाद्रक्तपित्तमुदीर्यते ।।
ते पूर्वं केवला रोगाः पश्चाद्धेत्वर्थकारिणः ।
उभयार्थकरा दृष्टास्तथैवैकार्थकारिणः ।।
कश्चिद्धि रोगो रोगस्य हेतुर्भूत्वा प्रशाम्यति ।।
न प्रशाम्यति चाप्यन्यो हेत्वर्थं कुरुतेऽपि च ।।
एवं कृच्छ्रतमा नृणां दृश्यन्ते व्याधिसङ्कराः ।
प्रयोगापरिशुद्धत्वात्तथा चान्योन्यसंभवात् ।।
(Caraka : Nidāna : *8* ; 16-22)

Needless to add, chronic metabolic disturbances, such as in Simmond's disease, Addison's disease, hypothyroidism, anaemia etc., all of which are, from the Āyurvedic point of view, the outcome of *agniduṣṭi* and consequent *āmadoṣa* (*mala-sancaya*) result in chronic forms of metabolic histotoxic anoxia of different degrees.

An explanation, as regards the status that should be given to oxygen in Āyurveda is perhaps necessary. Proceeding on the basis of its known properties, such as oxidation or combustion, corresponding to *dahana* and *tapana*, oxygen may have to be treated predominantly as a *taijasa* substance even though its state is gaseous i.e. *vayavīya*. There is at least, this interesting property, that it performs *urdhvagamana* (rectilinear upward movement) like *agni*. From the Āyurdedic point of view, *dravyas* or substances that are *urdhvagāmī*, in nature, are composed, predominantly of *agni* and *pavana*.[2] Oxygen is one such gaseous substance.

If details furnished by modern experimental physiology ond bio-chemistry are to be taken note of as regards *dahana* and *pacanakarmas* ascribed to *pitta*, then, it would appear that, in addition to *indhana* and *pacakāmśa*, oxygen which is predominantly *āgneya* in nature and function, would also seem to be an essential factor in this phenomenon. By pressing into service, the *Nyāya* nomenclature *'vijātīya tejas samyoga'*[1] to explain the part played by molecular oxygen in oxidative reactions, resulting in the production of energy and heat, the entire phenomena of *dahana, tapana* and *pacana* etc., can be satisfactorily explained. This is particularly important in the context of *pañcakarma* therapy *vis a vis* the promotion of *agni* and the *pacana* of *sañcitamalas* and their saparation from the *śākhā* and elimination by *vamana, virecana, basti* etc. This point will be discussed in a subsequent section.

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[1] T. R. Harrison *et al*, Principles of Internal Medicine : Anoxia : P 107 : Mc Graw-Hill New York Publication : Second Edition.

[2] (१) तत्राऽग्निमारुताऽऽत्मका रसा: प्रायेणोर्ध्वभाजो लाघवात् प्लवनत्वाच्च वायोरूर्ध्वज्वलनत्वाच्च वह्नेः ।
(Caraka - Sutra : *26* ; 41)
रसा इति रसयुक्तानि द्रव्याणि ।
(Cakrapaṇi on the above)
(२) द्रव्यमूर्ध्वगमं तत्र प्रायोऽग्निपवनोत्कटम् ।
(Aṣ. Hṛ : Sūtra : *9*; 11)

Thus, *āmadoṣa,* either acute, subacute or chronic, corresponding to *agni duṣṭi,* would appear to be the basis of the pathogenesis or *samprāpti* of nearly all diseases included under *kāyacikitsā.* The *pañcakarma* therapy, as one could see from the Āyurvedic medical classics, aims at the promotion of *agni,* the digestion and elimination of *malas* which are stated to have accumulated in the *śākhā* and bring them to the *Koṣṭha* for being eliminated. Thus, the functions of the tissues all over the body are sought to be restored to their normal states.

SECTION III

THE CONCEPT OF SROTĀMSI

A reference was made earlier to the channels of circulation of *doṣas, dhātus* and *malas* and to the fact that pathological involvements of these channels may lead to and become the site of the initiation of the disease process. Accordingly, all pathological manifestations other than those caused by *abhighāta* (trauma/stresses) have their origin at histological levels, before they are fully formed and manifest themselves to produce gross lesions and characteristic clinical symptoms.

A careful and critical appraisal of the role of the srotamsi in health and disease would, therefore, become relevant. In addition, an important aim of the *pañcakarma* therapy is the achievement of *srotośuddhi* or the cleansing of the *sukṣma* (subtle or microscopic) channels through which *doṣas, dhātus* and *malas* are stated to circulate.

The term *'srotas'* is derived from the root, *sru-sravaṇe'* meaning to move or to flow, 'to ooze or to exude'. This term has been defined as the structure in which oozing takes place—*'sravaṇat srotāmsi'*[2]

Generally speaking, the term *srotāmsi* is seen to comprehend channels—big, small and microscopic—as could be seen from its several synonyms viz., *srotāmsi* (channels), *Sirāh* (vein), *dhamanyah* (arteries), *rasāyanyah* (lymphatics, ducts), *rasavāhinyah* (capillaries), and *nadyah* (tubes)—the term *nadī* is also seen to apply to nerves[1] which are not apparently tubular)—*panthānah* (pathways), *mārgāh* (tracts), *Śarirachidrāṇi* (hollow spaces, cavities, holes), *samvṛtāsamvṛtaṇi* (open as well as blind channels), *sthānāni* (locus), *aśayah* (a hollow organ) and *niketah* (resort). These are seen to include invisible channels which serve as resorts of *Śārira dhātus*.[2]

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[1] पाको नाम विजातीयतेजःसंयोगः । स च नानाजातीयः । रूपजनको विजातीयतेजःसंयोगस्तदपेक्षया रसजनको विजातीयः । एवं स्पर्शादौ अपि तथा । एवं प्रकारेण भिन्नभिन्नजातीयाः पाकाः कार्यवैलक्षण्येन कल्पनीयाः ।

(Nyāyabodhinī on Annam Bhaṭṭa's Tarkasamgraha)

[2] स्रवणात् स्रोतांसि ।

(Caraka : Sūtra : *30;* 12)

स्रवणादिति रसादेरेव पोषकस्य स्रवणात् ।

(Cakrapāṇi on the above)

The structures to which the *paryāyas* (synonyms) mentioned above refer include macroscopic as well as microscopic structures. The bigger varieties such as *śiras*, *dhamanīes*, *rasāyanīs*, *nadīs*, *āśayas* etc., are today shown to be composed of still smaller channels of microscopic dimension. Of importance, to the present context, are the extremely fine and often microscopic channels, described as *srotāmsi*, even though, such gross structures as the *mahāsrotas*, are also known to come up for consideration. For, the *mahāsrotas* or the *annavahasrotas*, as it is also known, is itself seen to be composed of numerous minute *srotāmsis*, described as villi and crypt glands—both of which are epithelial in their structure.

The concept of *srotāmsi* is of fundamental and primary importance, both in health and disease. This has been emphasised by Caraka who has drawn a comparison between the functional diversity of the circulatory mechanism of the body and its various components, which latter, cannot flourish or decay independent of the former. For, as pointed out by him, it is indeed the *srotāmsi* which subserve the purpose of circulation by the transport of nutrient elements which are subject to metabolic transformations.[3]

In view of the overriding importance attached to *srotāmsi*, in physiological and pathological states, some contemporaries of Punarvasu Atreya appear to have gone to the extent of advancing the view that, "Man is nothing but a conglomeration of *srotāmsi*, since they pervade the entire body. In addition, they are the conduits to factors that bring about the *prakopa* or *Śamana*, as the case may be, of *doṣas*".[4] Important as the *srotāmsi* are, the views noted above, appear to have been considered by Punarvasu Ātreya as exaggerated, for as pointed out by him, there are other factors that are equally important. Thus, for example, substances with which the *srotāmsi* are composed, the *dhātus* to which they serve as conduits and the regions which they cover are equally important.[1]

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[1] Nerve is not really a solid structure as it appears to be. For, it is seen that its main core—the axoplasm—flows through an extremly delicate tubular structure made of the plasma membrane, known as axolemma. In this sense, the nerve can also be included under the category of *nāḍī*.

[2] स्रोतांसि, सिराः, धमन्यः, रसायन्यः, रसवाहिन्यः, नाड्यः, पन्थानः, मार्गाः, शरीरच्छिद्राणि, संवृतासंवृतानि, स्थानानि, आशयाः निकेताश्चेति शरीरधात्ववकाशानां लक्ष्यालक्ष्याणां नामानि भवन्ति ।

(Caraka : Vimāna : *5;* 9)

[3] यावन्तः पुरुषे मूर्तिमन्तो भावविशेषास्तावन्त एवास्मिन् स्रोतसां प्रकारविशेषाः । सर्वे हि भावा पुरुषे नान्तरेण स्रोतांस्यभिनिर्वतन्ते, क्षयं वाऽप्यभिगच्छति । स्रोतांसि खलु परिणाममापद्यमानानां धातूनामभिवाहीनि भवन्त्ययनार्थेन ।

(Caraka : Vimāna : *5;* 3)

[4] अपि चैके स्रोतसामेव समुदयं पुरुषमिच्छन्ति, सर्वगतत्वात् सर्वसरत्वाच्च दोषप्रकोपणप्रशमनानाम् ।

(Caraka : Vimāna : *5;* 4)

The two views, referred to above, are important, for, literally and figuratively, the animal body is nothing but channels of different shapes and kinds and they conduct various kinds of substances. Even so, as pointed out by Punarvasu Ātreya, such factors as the composition (structure) of the *srotāmsi*, the material they transport and the areas they cover are equally important. Leaving the above aside for the moment, it is seen that the term *srotāmsi* is specifically employed to refer to channels of microscopic dimension, resembling the functional description of the endothelial walls of capillaries, plasma membranes of cells, the epithelium of villi, glands etc.

The validity of the foregoing observations will be seen from Suśruta's description that "*srotāmsi* are channels which have their origin in an organ cavity (*chidram*) and they spread through the entire length and breadth of the body and transport *rasādi dhātus*. These *srotases* are different from and exclude *dhamanīs* (arteries) and *sirās* (veins)."[2]

We may, at this point, advert to the definition *srotāmsi* furnished by Caraka in the XXX Chapter of the *Sūtrasthāna* of his *Samhitā*, noted earlier, and also to an additional description provided by him in the XXVIII Chapter of the same *sthāna*, which latter, deals with nutrition and the *modus-operandi* of its distribution to and utilisation by different constituent tissues of the body. Observes Caraka : "*Ayanamukhāni* of *srotāmsi* are the means of distribution of nutrient *dhātus* and *malas* (to and from) different parts of the body which are supplied with required quantity of appropriate constituents they need".[3]

The term '*srotāmsi ayanamukhāni*' studied together with the definition of *srotas* as '*sravaṇāt srotāmsi*' assumes considerable importance. The literal implication of the term '*srotāmsi ayanamukhāni*' is that, the channels are themselves entrances. Cakrapāṇidatta, in clarifying the implications of this term, has interpreted the term '*ayanāni*' as channels through which things travel and the term '*mukhāni*' as the site of entry through which things enter. He has then proceeded to observe that '*ayanāni* (channel) and '*mukhāni*' openings for *dhātus* and *malas* are not distinct or different entities—meaning that the same channels which serve as vehicles of transport of both the nutrients and waste products also serve the purpose of their egress and ingress. Each one of the seven *dhātus* has its own (specific) *srotas* and they are named after the *dhātu*-nutrients they transport. They serve both as channels of egress and ingress as well as channels of transport.[1]

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[1] न त्वेतदेवं, यस्य हि स्रोतांसि, यच्च वहन्ति, यच्चावहन्ति यत्र चावस्थितानि सर्वं तदन्यत्तेभ्यः ।

(Chark : Vimāna : *5*; 4)

[2] मूलात् खादन्तरं देहे प्रसृतं त्वभिवाहि यत् ।
स्रोतस्तदिति विज्ञेयं सिराधमनिवर्जितम् ॥

(Suśruta, Śārīra : *9*)

[3] तेषां तु मलप्रसादाख्यानां धातूनां स्रोतांस्ययनमुखानि ।
तानि यथाविभागेन यथास्वंधातुनापूरयन्ति ।

(Caraka : Sūtra : *28*; 5)

The commentary of Cakrapāṇidatta, cited above, will assume added significance in the light of Suśruta's and Vāgbhaṭa's description of the way *rasadhātu* spreads throughout the body. Says Suśruta and Vāgbhaṭa : "*Rasa* spreads throughout the body through extremely tiny pores of *srotāmsi* which extends throughout the body very much like the spread of water in a lotus plant through the minute pores present in its stem."[2] This apart, the *niruktis* and *vyutpattis* of the terms '*ayanāni*' and '*mukhāni*' are self-explanatory. The former is seen to be derived from the root 'Iṇ-gatau'—'to go' or 'to move', implying that through which things move' and, the latter, from the root '*muclṛ-mokṣaṇe*'—'to leave' or 'to be free.' Amarasimha has described '*mukha*' as a synonym of '*nissāraṇa*', meaning a structure through which things get out (or get in). Caraka's description of *srotāmsi* as '*sravaṇat srotāmsi*' is nearly similar to that furnished by Amarasimha.[3]

A description of *srotāmsi* also occurs in the context of the production and distribution of '*ojas*' and, in particular, with reference to certain pathological events that interfere with its distribution. Thus, according to Caraka, '*ślaiṣmika ojas*, to the prodution of which all the *dhātus* contribute their essence, is transported from *hṛdaya*, through the *daśamahāmūla dhamanīes*. They are spoken of as *dhamanīes* because, they pulsate ; as *srotas*, because, they permit oozing and, *sirās*, because, they maintain a steady flow of *rasādi*.[4] The order in which these three channels have been described is significant. It describes, in simple terms, the different functional components of the vascular system in which the heart occupies the central position. Figuratively speaking, the great vessels of heart, the aorta, on the one hand and caval-veins, on the other, start from and end in this organ. In this sense, these vessels have their roots in the heart. Nod oubt, *dhamanīes*, *srotāmsi* and *sirās* are distinct and they exhibit morphological and functional differences (assuming that the *dhamanīes* are arteries, the *srotāmsi* are capillaries, the *sirās* are veins and *rasavāhinīs* are the lymphatics).[5]

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[1] अयनानि च तानि मुखानि चेत्ययनमुखानि अत्र आयान्त्यनेनेत्ययनानि मार्गाणि, मुखानि तु यैः प्रविशन्ति; एतेन मलानां धातूनां च यदेवायनं तदेव प्रवेशमुखमिति नान्येन प्रवेशो नान्येन च गमनमित्युक्तं भवति। रसादीनां यथास्वनाम स्रोतोमुखं चायनं च।
(Cakrapāṇi on Caraka : Sūtra : *28;* 5)

[2] बिसानामिव सूक्ष्माणि दूरं प्रविसृतानि च।
द्वाराणि स्रोतसां देहे रसो यैरुपचीयते॥
(Aś. Hṛ. Śārīra : *3;* 46)

[3] मुखं निःसरणम्। (Amarkośa, P. 123)

[4] तेन मूलेन महता महामूला मता दश।
ओजोवहाः शरीरेऽस्मिन् विधम्यन्ते समन्ततः॥
× × × × × ×
ध्मानाद्धमन्यः स्रवणात् स्रोतांसि सरणात्सिरा।
(Caraka : Sūtra : *30;* 8 & 12)

[5] In this thesis however, the author has proceeded on the basis of the terms as described against them :—

Sirās : blood vessels which drain blood into the heart from different parts of the body-veins and venules.

Dhamanīs : Vessels which carry blood from the heart to different parts of the body—arteries and arterioles.

Srotāmsi : All the remaining channels, viz. capillary bed, plasma and other semi-permeable membrane, lymphatics & ducts.

Nonetheless, there are points of identity as well as diversity. In so far as the points of identity of these three different components of the vascular system are concerned, it has been shown that the heart and the entire vascular system are lined with a single continuous layer of smooth flat cells. These cells constitute the entire wall of the blood and lymphatic capillaries. The endocardium of the heart is composed of a delicate endothelial layer as in the case of the capillaries, which is one cell-thick. The same is also the case with the tunica intima of the veins and lymphatics. Differences, relate to the preponderance of muscle and fibrous elastic tissues that envelop the lining layer in the larger vessels. The wider the vessel, the sturdier and thicker is its wall. This is particularly so in the case of arteries which bear the full brunt of internal fluid pressure as compared to the veins and the lymphatics. Arterial blood flows in rythmic spurts in keeping with the rythm of the heart. As each spurt of the fluid impinges on the walls of the artery it gives rise to vibration and pulsation-*dhamana*. Even so, with the increase of the distance from the heart, arterial spurts gradually become less forceful ; as the blood circulates through the veins the spurts cease and it flows in a continuous even stream—*saraṇam*. It will, thus, be seen that in the order of description we proceed from *dhamanam* in *dhamanīes*, *saraṇam* in *sirās* and *sravaṇam* in the *srotāmsi*.

The reason why Suśruta excluded *dhamanīes* and *sirās* from the *srotas* will now become obvious. Oozing, exudation, transudation, filtration, diffusion etc., take place at the level of *srotāmsi* and not at the levels of *dhamanīes* and *sirās*.

Reverting to the mode of distribution of ojas *vis a vis srotāmsi*, Suśruta has used the term '*dhātugrahaṇam*' together with the term '*nihśrutam*', in the context of the loss of this substance by leakage, in the condition described as '*ojovisramśa*'. Dalhana has interpreted the term "*dhātugrahaṇam*' as the *dhātuvaha-srotāmsi* and the term '*nihśrutam* as '*nirgatam*' or, in the alternative, as the leakage or escape of *ojas* from the *hṛdaya* through '*srotomukhāni*'. The term '*srotomukhāni*, as pointed out earlier, refers to openings or pores present in the *srotāmsi* of *hṛdya*. Cakrapāṇidatta has, in his Bhānumati tīka on Suśruta also interpreted the term '*dhātugrahaṇam*' as standing for *dhātuvaha-srotāmsi*.[1]

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[1] अभिघातात् क्षयात् कोपाच्छोकाद् ध्यानाच्छ्रमात् क्षुधः ।
ओजः संक्षीयते ह्येभ्यो धातुग्रहणनिःसृतम् ॥
तेजः समीरितं तस्माद् विस्रंसयति देहिनः ।
(Suśruta : Sūtra : *15* ; 23)

(१) धातुग्रहणमिति धातवो गृह्यन्ते यैस्तानीति धातुग्रहणानि धातुवाहीनि स्रोतांसि, तेभ्यो निःसृतं निर्गतं सर्वधातुस्नेहपरम्परारूपेण । अथवा धातुग्रहणं हृदयं धातुवहस्रोतसां स्थानत्वात्, तस्माद् हृदयान्निःसृतं स्रोतसां मुखैरेव । अन्ये तु हृदयमेव धातुं न ग्रहणातीति धातुशब्देनैव हृदयमुच्यते ।
(Dalhaṇa on the above)

(२) धातवो गृह्यन्ते यैस्तानि धातुग्रहणानि स्रोतांसि ओजोवाहीनि, यदुक्तं-ओजोवहा विधम्यन्ते शरीरेऽस्मिन् समन्ततः (च० सू० अ० ३०) इति । किंवा धातुग्रहणस्रोतःस्थानतया धातुग्रहणं हृदयं, ततो निःसृतं धमनीभिरेव ।
(Cakrapāṇi on the above)

In addition to the foregoing, *srotāmsi* are seen to be specific to the *dhātus* i.e., nutrient homologous of the basic tissue complexes which they transport. There are many references in the *samhitāgranthas* to support this view. A significant reference, however, occurs in the chapter on *rājayakṣmā cikitsā* in Carakasamhitā. Caraka has, in this reference, employed the term *dhātu* to mean *poṣaka* or nutrient *dhātus* which nourish the *poṣya* or existing formed tissues ands tated that, the former are transported through their own respective specific *srotāmsi.*[1] For example, the transport of the *poṣaka raktadhātu* to the *poṣyaraktadhātu* takes place through its own specific *srotas*—the *raktavahāsrotas.* Likewise, the *poṣaka māmsa dhātu* is conveyed to the *Poṣya māmsadhātu* through the *māmsavaha srotas.* Similar arrangements hold good in the case of the supply of nutrition to other *poṣya-dhātus* also. An implication of the concept of the specificity of the *dhātuvaha srotāmsi* is that the nutrition meant for one *dhātu* may not be transported through *ṣrotāmsi* other than its own or, if they circulate through other *srotases,* they may not be supplied to *dhātus* other than those for which they are meant. This may be illustrated with the example of the circulation of nutrient substances of, say the *māmsadhātu* carried by the common vehicle, the *rasadhātu* through the *asthidhātu,* may not supply these substances to this *dhātu.* Only the material meant specifically for the *asthidhātu* may be allowed to permeate the *srotas* and supply that *dhātu.*

Recent trends of research in the fields of physiology and biochemistry point to the fact that specificity of *srotāmsi* undoubtedly exists. Discussing Starling's hypothesis relating to the mechanism and dynamics of exchange of materials between arterial and venous branches of circulation Abraham White *et al* have noted that, "Although consistent with many observed facts, Starling's concept of exchange of material between the arterial and venous branches of the circulation does not account for the differences of exchange among various tissues. Additional factors are the structure of the membrane which seperate capillaries from tissue-spaces and rapid diffusion along the length of the capillary. Insight into ahe difference in the nature of the capilliaries of striated muscle has been gained by comparative measurements of the rates of diffusion of water and solutes between the vascular bed and the extra-cellular spaces of kidney and muscle. In these studies, the permeability of water was found 100-fold greater for the glomerular capillaries than from those of muscle. These results were most readily accounted for by assuming the presence in the capillary wall of pores, the numbers of which per unit area, as well as their shapes and dimensions, can be assumed to vary according to the tissue in which the capillaries are found. Thus, Starling's concept which assumes the ultra-filtration of blood constituents is modified to include the concept of porous capillary wall, with pore-numbers, dimension and shapes varying in capillaries of diverse tissues and the operation of a rapid diffusion process across the capillaries".[1]

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[1] स्रोतसां च यथास्वेन धातुः पुष्यति धातुतः ।

(Caraka : Cikitsā : *8* ; 39)

The significance of the foregoing to the *pañcakarma* therapy is fundamental, especially, as the object of this therapy, as stated earlier, is to cleanse the *srotāmsi*, clear obstructions and facilitate the elimination of *malas* accumulated in the *dhātus* as a result of *srotoduṣṭi*.

It is now necessary to advert to *khavaiguṇyam*, referred to earlier, *Khavaiguṇyam* or *srotoduṣṭi* (*srotovaiguṇyam*), as it is also known, has been stated by Caraka, to initiate various kinds of abnormalities. In this view, the vitiation of *srotas* may, according to the nature of the involvement, result either in *atipravṛtti* (hyper-activity) or *Saṅga* (obstruction), *śirāgranti* (dilatation of the related *siras*) and *vimārga-gamanam* (the flow of the content of the *srotas* involved, through pathways other than its own).[2] Commenting on a similar passage in the Aṣṭānga Hṛdaya, Aruṇadatta has cited the example of *mūtra* (urine) and *śakṛt* (faeces)—*vāhi srotāmsi* to illustrate the phenomenon of *atipravṛtti* and *saṅga*. *Bahumūtrata* (polyurea)as in *prameha* (diabetes insipidus/mellitus) and *mūtrakṛcchra* (the retention of urine as in stricture urethra) have been described by him as due to *atipravṛtti* and *saṅga* respectively of the *mūtravahā srotāmsi*. Likewise, *atisāra* (diarrohea) and either partial or complete retention of *śakṛt* (faeces) as in *udāvarta* (constipation) are, in his opinion, due to *atipravṛtti* and *saṅga* respectively of the *śakṛtvaha-srotāmsi*. He further observes that the same principle applies to other *srotāmsi* also.[3]

Sirāgranthi has reference to dilatation or thickening of the veins (as in varicosity). Since the condition described as (*sirāgranthi* is a fully manifested clinical state resembling varicose veins in which pathological changes have already come to stay, a better example, to illustrate the idea underlying this term which, in the present context, obviously refers to early or initial phase of the evolution of a pathological process having its origin in histological levels would be the dilatation and the narrowing of the of veins in which tissue-fluids are drained and the consequent passive congestion without adequate compensation.

The term *vimārgagamanam* describes the passage of the contents of the *srotas* through pathways other than its own. An example of this condition is the back pressure phenomenon as can be illustrated with the example of the transudation of fluid into the peritoneal cavity in cases of portal obstruction or the establishment of collateral circulation, as in *jalodara* (ascites)

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[1] Abraham White : Principles of Bio-chemistry P. 734 : Mc Graw Hill Book Company, New York Publication Edition, 1954.

[2] अतिप्रवृत्तिः सङ्गोवा सिराणां ग्रन्थयोऽपि वा ।
विमार्गगमनं चापि स्रोतसां दुष्टिलक्षणम् ॥
(Caraka : Vimāna : *5* ; 24)

[3] अतिशयेन प्रवृत्तिर्यथा मूत्रवाहिस्रोतसां प्रमेहवद्बहुमूत्रता संगोऽप्रवृत्तिः। किंचिद्वा प्रवृत्तिर्मूत्रकृच्छ्रवत्। शकृद्वाहिनां स्रोतसामतीसारवत्पुरीषातिसरणमतिप्रवृत्तिः। संग स्तोकं कृत्वा पुरीषस्य प्रवृत्तिः। अथवा सर्वथोदावर्तवत्पुरीषस्याप्रवृत्तिः।
(Aruṇadatta on Aṣ. Hṛ. Śārīra : *3* ; 45)

Suśruta's reference to the occurance of the disease at the site of obstruction to circulation of the *prakupita-doṣas* due to *khavaiguṇyam* is significant.[1] Caraka is seen to have related the obstruction due to *khavaiguṇyam* to the circulation of *rasa* as well as the *prakupita doṣas*.[2]

After all is said and done, it is the *rasa dhātu*, in the final analysis, which serves as the vehicle of transport of *dosas*, *dhātus* and *malas*. This principle will hold good to abrnormal conditions also; the *prakupita dosa's* too circulates through the medium of the rasa. Any obstruction to the circulation of the *rasa*, at the level of the *srotāmsi* may, *ipso facto*, lead to the initiation of the process of the disease in that place. This is also in keeping with the doctrine that the circulating blood is both *rasa* and *rakta* (analogous to the plasma carrying the erythrocytes). Cakrāṇidatta has tacitly recognised this fact in his criticism of *sarvātmapariṇāmapakṣa*. Says Cakrapāṇidatta: "*Rasa* in its entirety is not converted as *rakta*. Obviously, that portion of it which is homologous to *rakta* is turned into this *dhātu*. The remaining portion of *rasa* is spoken of as the *rakta* i.e. *rasa* carrying *rakta*".[3] Even otherwise, Suśruta has stated that the *prakopa* of *rakta* is due to the *prakupita doṣa*.[4] It would, therefore, appear that *rakta* is not only an index but also the vehicle of transport of morbific factors that are associated with the vitiation of the *doṣas*. Likewise, the *kṣaya* or *vṛddhi*, as the case may be, is stated to be due to the state of the *śoṇita* or *rakta*.[5]

Thus, the term *khavaiguṇyam* may refer to a primary functional disturbance of *srotāmsi* followed by structural abnormalities which may either result in increased permeability leading, in consequence, to *atipravṛtti* or leakage in excess of body fluids, as in *atisāra* (diarrhoea) or *bahumūtrata* (polyurea) or, in the alternative, inability to permit normal exchange of materials, resulting in retention or lead either to an enlargement of the related lymphatics resembling knots or the dilatation of veins i.e., *sirāgranthi* or, the movement of the contents of the involved *srotāmsi* through channels other than their own.

Khavaiguṇyam, marked by *saṅga* or *srotorodha*, is seen to characterise the fourth *kriyākāla*, described by Suśruta as *sthānasamśraya*, corresponding to the phase when *pūrvarūpa* or prodromal symptoms of the disease manifest.[1] This stage is considered to be important as it represents the transition between the sub-clinical and clinical phases of the evolutive process of the disease. In addition, definite structural lesions are stated to occur in this phase.

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[1] कुपितानां हि दोषाणां शरीरे परिधावताम् ।
यत्र संङ्गःखवैगण्याद्व्याधिस्तत्रोपजायते ॥
(Suśruta : Sūtra : *24* ; 10)

[2] क्षिप्यमाणः खवैगुण्याद्रसः सज्जति यत्र सः ।
करोति विकृतिं तत्र खे वर्षमिव तोयदः ॥
दोषाणामपि चैवं स्यादेकदेशप्रकोपणम् ।
(Caraka : Cikit : *15* ; 37-38)

[3] अत्रापि हि पक्षे न सर्वो रसो धातुरूपशोणिततामापद्यते, किं तर्हि कश्चिदेव शोणितसमानो भागः, शेषस्तु शोणितस्थानगतत्वेन किंचिच्छोणितसमानवर्णादित्वाच्च शोणितमुच्यते ।
(Cakrapāṇi on Caraka : Sūtra : *28* ; 4)

[4] यस्माद्रक्तं विना दोषैर्न कदाचित् प्रकुप्यति ।
तस्मातस्य यथादोषं कालं विद्यात् प्रकोपणे ॥
(Susṛuta : Sūtra : *21* ; 26)

[5] त एते शरीरधारणाद्धातव इत्युच्यन्ते । तेषां क्षयवृद्धी शोणितनिमित्ते ।
(Susṛuta : Sūtra : *14* ; 21)

The implications of this phase, from the point of view of *samprāpti* or pathogenesis i.e., the natural history of the development of the disease are that, the earlier evolutive phases of the disease viz., *caya* and *prakopa of doṣas* are characterised by vague symptomatology, corresponding to functional disturbances, whereas, the phase of *sthānasamsraya*, corresponds to the stage of the occurance of metabolic disturbances at the level of the *srotāmsi* (vascular-capillary bed and the tissues) resulting in the blocking of the metabolic pathways and capillary exchanges, leading to the localisation of the lesion.

A situation similar to the one referred to, in the foregoing, described by modern medicine, is 'increased capillary and cell-membrance permeability (with the resulting equalisation in the chemical composition of intra and extra cellular fluids), haemoconcentration, tissue-catabolism, hypotension, hypothermia, hypokalemia, clinical manifestation of ´shock', gastro-intestinal erosion etc'.[2]

The phenomenon envisaged in the concept of *khavaiguṇyam* and *srotoduṣṭi* needs a scientific appraisal. Regardless of the class to which the *srotas* may belong, *rasavaha*' *raktavaha* and the rest, they resemble the description of epithelial tissues. Epithelial tissues generally cover the surface of the skin or form the delicate lining of the body cavities which open directly or indirectly into the surface. These tissues are classed under two groups from the point of view of their embryological origin viz., (*a*) mesothelial tissues or mesothelium which line the thoracic or abdominal cavity and (*b*) endothelial tissues or endothelium which are delicate tissues that line the heart cavity and blood-vessels. Mesothelium may have a parallel in the different kinds of *kalās*[3] described in Āyurveda. The description of the endothelium, on the other hand, bears a close resemblance to the delicate tissue—one cell layer thick—that constitutes the lining membrane of the heart and blood-vessels and, in particular, the capillary tubes. This description appears to be similar to that of *srotāmsi* which has been stated to serve both as '*ayanāni* and '*mukhāni*' and permit the exchange of nutrients between the *rasa-rakta* and *sthāyi-dhātus*. The reason for the introduction of this description here is to draw attention to the fact that cells or *śārīravāyavaparamāṇus* that constitute the endothelial tubes, allow permeation, filtration diffusion, exudation and transudation of materials transported by *rasa-rakta* through the inter-cellular pores (*mukhāni*).

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[1] अत ऊर्ध्वं स्थानसंश्रयं वक्ष्यामः। एवं प्रकुपितास्तांस्तान् शरीरप्रदेशागभ्य तास्तान् व्याधीन् जनयन्ति।××-××। तेषामेवमभिनिविष्टानां पूर्वरूपप्रादुर्भावः ××××। तत्र पूर्वरूपगतेषु चतुर्थः क्रियाकालः।
(Susṛuta : Sūtra : *21* ; 33)

and also

प्रसृतानां पुनर्दोषाणां स्त्रोतोवैगुण्याद् यत्र सङ्गः स स्थानसंश्रयः××××।
(Dalhaṇa on above)

[2] Hans Selye and Claud Fortier, 'Adaptive reaction to stress". Life stress and Bodily disease, P. 4, 1954. Edition : Williams and Wickins Publication.

[3] कलाः×××× धात्वाशयान्तरमर्यादाः।
(Susṛuta : Sārira : *4* ; 5)

The foregoing notwithstanding, the capillary tube, which can be justifiably likened to the *dhātuvaha-srotāmsi* as well as the plasma membrane of cells, as indeed the columnar epithelium of the intestinal villi, are stated to be semi-permeable in the sense that they exhibit a selective discrimination as regards permitting or with-holding entry, as the case may be, of certain materials. In the absence of satisfactory physico-chemical explanation of selective or discriminative permeability, this phenomenon may be said to form part of vital functions of living cells. In other words, the transfer of materials from one side of the semi-permeable membrane to the other, either due to physical causes or vital selectivity, or both, have been shown to involve an expenditure of energy by the concerned cells, has been correlated to metabolic-oxidative reactions that take place in them.

If the facts referred to in the foregoing, are recognised, then, the phenomenon described in Āyurveda as *khavaiguṇyam* or *śrotoduṣṭi* which involve metabolic events can be satisfactorily explained. It may now be postulated that the primary disfunction or impairment of the functions of *srotāmsi*, described as *khavaiguṇyam*, relates to *agniduṣṭi* in the cells that compose the structure of *srotāmsi*. This may be expected to impair the normal functions of these cells which may loose their selective discrimination and the impairment of the regulation of the passage of materials from one side to the other. This, in turn, may be expected to lead to the inception of the lesion at the histological level. The tissues to which these capillaries supply nutrition and clear their waste-products are now unable to rid themselves of their own wastes i.e., malas. This may interfere with the utilisation of the available nutrients, leading virtually to cell intoxication—a condition which may be aptly described and *āmadoṣa* or *āmaviṣa*, at the level of the *dhātus*.

Thus, as stated by Caraka, so long as the *sriotāmsi* maintain their integrity as long the body will be free from disease.[1] In the reverse direction, when the integrity of the *srotāsmi* is impaired, then, both the *sthāyi dhātus* (described as *sthānasthaḥ*) and *asthāyī dhātus* (described as *mārgagaḥ*) become excited and vitiated. This excitement and vitiation spread from one *srotāmsi* to another. The impaired *srotāmsi* are themselves the means for the dissemination of vitiation to other *srotāmsi* and, likewise, from one vitiated *dhātu* to another. On the otherhand, the vitiated *vāta*, *pitta* and *kapha* vitiate the entire organism.[2] Even so, it may be stated that as a general proposition, *āhāras* (foods) and *vihāras* (actions) that conduce to the vitiation of the *dhātus* or are deleterious to the *dhātus*, serve as vitiatives of *srotāmsi*..[1]

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[1] तदेतत्स्त्रोतसां प्रकृतिभूतत्वान्न विकारैरुपसृज्यते शरीरम् । (Caraka : Vimāna : *5* ; 7)

[2] तेषां प्रकोपात् स्थानस्थाश्चैव मार्गगाश्चैव शरीरधातवः प्रकोपमापद्यन्ते इतरेषां च प्रकोपादितराणि । स्रोतांसि स्रोतांस्येव धातवश्च धातूनेव प्रदूषयन्ति प्रदुष्टाः। तेषां सर्वेषामेव वातपित्तश्लेष्माण प्रदुष्टाः दूषयितारो भवन्ति दोषस्वभावादिति ।
(Caraka : Vimāna : *5* ; 9)

Many are the causes that excite the *doṣas* and initiate the process of disease. They have been described in extense by Caraka, Suśruta and Vāgbhaṭa under three distinct categories viz., *asātmyendriyārtha samyoga*, *prajnāparādha* and *pariṇāma*. These need not be gone into here except for noting that, due to the operation of any one or more of these etiological factors, *doṣas* may attain *prakopa* in various ways and cause different kinds of diseases in *sākhā*, *koṣṭha*, and *marmāsthisandhyah*..[2]

These three groups of structures (and organs) are included under three kinds of *rogamārgas* or pathways of diseases viz., *bāhya*, *madhyama* and *ābhyantara*, described in Āyurveda. The obvious mode of disemination of the *prakupita doṣas* from *koṣṭha* to the one or the other of the *rogamārgas* where the disease manifests itself, are through the *srotāmsi*.

As will be shown in a subsequent section, such *pañcakarma* measures as *sneha wseda*, *vamana*, *virecana*, *basti* etc., together with their adjuncts *laṅghana*, *pacana* etc., are meant exclusively to cleanse the *srotāmsi* and *srotosuddhi* and restore their functional and structural integrity, as also enable the *asthāyi dhātus* to nourish the *sthāyi dhātus* and promote the *agnis* of *sthāyi dhātus* so that they may utilise the nutrition purveyed to them.

SECTION IV

ROGA MĀRGAS

Three *rogamārgas* have been described, specially by Caraka and Vāgbhaṭa. They are (*a*) the *bāhyarogamārga*, (*b*) the *madhyama rogamārga* and (*c*) *ābhyantara rogamārga*. Each *rogamārga* is stated to comprise a number of tissues, organs or structures. Thus, the *bāhyarogamārga* is stated to comprise the *saptadhātus* minus *rasa* plus *tvak*. The *madhyamarogamārga* is seem to comprise the *marmas* the such as the basti (urinary apparatus), *hṛdaya* (heart), *mūrdhā* (head), *asthisandhyah* (bony joints and their articulations) and the related *snāyus* and *kandarās* (tendons and ligaments). *Ābhyantararogamārga*, on the other hand, known also as *āntararogamārga*, is stated to comprise *koṣṭha* which latter is known by various synonyms viz., *mahāsrotas* (the great channel), *śarīramadhya* (middle of the body, the trunk), *mahānimna* (the great cavity) and *āmapakvāśaya* (the stomach, small intestine and large intestine). The list of diseases[3] that are stated to occur in each of these *rogamārgas* may be seen in the table below :

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[1] आहारश्च विहारश्च यः स्याद्दोषगुणैः समः ।
धातुभिर्विगुणश्चापि स्त्रोतसां स प्रदूषकः ॥
(Caraka : Vimāna : *5* ; 23)

[2] निदानमेतद्दोषाणां कुपितास्तेन नैकधा ।
कुर्वन्ति विविधान् व्याधीन् शाखाकोष्ठस्थिसंधिषु ॥
(Aś. Hṛ. : Sūtra : *12* ; 43)

[3] तत्र गण्डपिडकालज्यपची ×××× शाखानुसारिणो भवन्ति रोगाः। पक्षवधग्रहापतानकार्दित ×××× मध्यमार्गानुसारिणो भवन्ति रोगाः। ज्वरातीसारछर्द्यलसक ×××× कोष्ठानुसारिणो भवन्ति रोगाः।
(Caraka : Sūtra : *11* ; 49)

Table I

List of Diseases

Bāhya Rogamārga	*Madhyama Rogamārga*	*Ābhyantara Rogamārga*
1. *Ganḍa*	1. *Pakṣavadha*	1. *Jwara*
2. *Pidakā*	2. *Graha*	2. *Atisāra*
3. *Apaci*	3. *Apatānaka*	3. *Caradi*
4. *Kila*	4. *Ardita*	4. *Alasaka*
5. *Adhimāmsa*	5. *Śoṣa*	5. *Viṣucikā*
6. *Mashaka*	6. *Rājayakṣmā*	6. *Kāsa*
7. *Kuṣṭha*	7. *Asthiśūla*	7. *Śvāsa*
8. *Vyanga*	8. *Gudābhramśa*	8. *Hikkā*
9. *Visarpa*	9. *Śiroroga*	9. *Ānāha*
10. *Shvayathu*	10. *Hṛdroga*	10. *Udara*
11. *Gulma*	11. *Bastiroga*	11. *Plīhā*
12. *Arśa*		12. *Visarpa*
13. *Vidradhi*		13. *Śvayathu*
		14. *Gulma*
		15. *Arsa*
		16. *Vidradhi*

An appraisal of *rogamārgas* is germane to this thesis for the following reasons :

(1) The *pañcakarma* therapy, as stated earlier, aims at the promotion of the *Pācana* of *śākhāśrita doṣas* (*malas*) i.e., digestion of the accumulated (or partly prepared) intermediary metabolites or waste products of tissues, as the case may be, which could neither be utilised nor cleared out by the cell-elements of tissues included under *śākhā*, the promotion of *agni* in the *sthāyīdhātus* (formed tissues) and the clearance of their respective *srotāmsi* so that *doṣas* (now called *malas*) may be channeled to the *koṣṭha* from where, they may be eliminated by *vamana* (emesis) and *virecana* (purgatives) or *basti* (enemeta), as the case may be.

(2) Likewise, the *sañcitadoṣas* (now *malas*) from the *madhyamarogamārga* are also to be brought to the *koṣṭha* and eliminated therefrom, as in the case of number one above. It may be noted here that, in pratice, even today, some aspects of *pañcakarma* therapy, especially *pinḍasveda, śirovasti, dhāra* etc., are mainly applied in such diseases as *pakṣavadha, ardita, sandhiśūla, śiroroga, āmavāta* etc. ,all of which are stated to occur in the *madhyamarogamārga.*

(3) Even so diseases that occur in *ābhyantara rogamārga* such as *udara, gulma* etc., are expected to be treated with the one or the other of the measures included under *pañcakarma* therapy.

It would appear that the *koṣṭha* plays a leading role, both in the initiation of the process of disease and in the treatment meant for them. Needless to add, the basic factor of disease being *agniduṣṭi*, it involves *pari pasu*, the impairment of the *agni present* in each *dhātu*, especially, the *pācakāmśas* present in them. More than anything else, the *koṣṭha*, in this view, is also seen not only to be an organ of digestion and absorption but also one of excretion. It has recently been suggested that urea and sodium, in fair amounts, are excreted into the stomach through the gastric mucosa. It is an established fact that a number of excretory products are, in part, excreted through the liver and bile into the duodenum for further disposal. As regards the large intestine, it is well known that food residue constitute relatively a small proportion of the bulk of the faeces. "The fat, protein and carbohydrate of the diet is, practically, all absorbed and if the food be free from indigestible material, especially cellulose, the faeces are composed almost entirely of bacteria, secretion etc."[1] It has been shown that during starvation, faeces continue to be formed and its composition does not differ materially from that of the faeces passed after an ample diet. By an experiment in which a segment of bowel, when isolated from the rest of intestinal tract, was seen, after a time, to be packed with a mass of pasty faecal material which was shown to be entirely of endogenous origin.[2]

According to recent trends in physiology, the function of the gastro-intestinal tract has been shown to compare favourably with that of the urinary tubule—nephron which latter, as is well known, performs both secretory and excretory functions. In this view, the entire *mahāsrotas* is, figuratively speaking, a nephron, many a times magnified.

It is also well known that the bulk of the venous blood from the abdominal cavity is channeled to the liver through the portal vein, from the liver to inferior vena cava through hepatic vein and the inferior vena cava empties itself into the right auricle of the heart. The venous blood from the lower extremeties and the pelvic-cavity courses up through the inferior vena cava, which latter, together with the blood from hepatic vein, discharges its content into the right auricle of the heart. The blood from the thoracic cage, upper extremity and head and neck is lead on to the right auricle of the heart through the superior vena-cava. Waste products which have reached the liver directly are disposed of by this organ and those brought to it through arterial circuit are also, likewise, dealt with by this organ. It would, therefore, appear to be reasonable to speculate that the stomach may be made to withdraw materials in solution in the blood through the vomitus by the induction of vomiting. Waste products brought to the liver ay be cleared by purgatives which are essentially cholagogues, hydrogogues or cathartics, in nature.

The separation and elimination of intermediary metabolites and waste and products of tissue metabolism, in conditions described and *āma* and *sāma*, would appear to be conditioned by preparatory measures, which seek to promote the *agni* in *dhātus*. For this purpose, the *sneha* approach to *dhātus* is meant to provide solvents that are essentially in the nature of lipids so that they may easily permeate the *sromtāmsi* i.e., the semipermeable capillary wall and plasma membrane of cells ; fatty acids not only permeate the cells but also provide the fuel necessary for the production of energy so necessary for the completion of metabolic sequences which, in the *āma* state, have remained incomplete. Recent trend in biochemistry have shown that "the synthesis of proteins is an endothermic reaction and will take place in cells only if energy is made available. This energy, in the last analysis, comes from oxidation of small organic substances such as pyruvic acid derived from the intermediate metabolism of glucose, fatty acids, or amino acids. This oxidation is a very complicated process.... But, at any stage, the energy transformation can be impeded by substances which inhibit or poison the enzyme system involved, in this stage."[1]

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[1] Best and Taylor : Physiological Basis of Medical Practice p. 589 : Williams' Wilkins Publication : Edition 1950.

[2] (Ibid).

It may be recalled, in this connection, that the *vāta* system is, for the most part, *sneha* based. Any deficit of *sneha* and *snigdhādi amśas* in the *vāta*-aparatus was shown earlier to lead to various kinds of disturbances, including some, which belong to *bāhyarogamārga-dhātugatavāta* and, in *madhyamarogamārga*, such as *pakṣavadha*, *ardita* etc. Considering the morphological and biochemical nature of the *vāta*-system, there can be no better approach to this system than through *sneha*. This method of approach may be considered to aim at the promotion of the normal metabolic functions of the concerned tissues, clear their waste-products as may have accumulated in them and compensate the *sneha* deficit suffered by the related tissue.

When an optimum *snehapāna* has been achieved, as could be judged from signs and symptoms described for *samyaksnehana*, increased blood flow to the tissues is sought to be promoted by one or the other kind of *svedana karmas*. An increased blood flow, in its turn, brings in more oxygen, leading to the combustion of the partly metabolised substances, now in a fit condition to be oxidised and cleared. Increased blood flow brought about by *svedana* may also be expected to promote the rapid clearance of waste products from the tissues through the lymphatics and venous circulation, to the liver and heart. With the appearance of the *lakṣaṇas* (signs and symptoms) indicative of *samyaksvedana*, the clearance of *doṣas* (*malas*) is sought to be achieved by *vamana* (emesis) with suitable emetics. The vomitus cleared through successive paroxysms of vomiting may be expected to eliminate the waste products which can be cleared through this channel. This is to be followed by specially planned diets, in keeping with the scheme of *samsārjanakrama*, which facilitates the promotion of *agni* in the *koṣṭha* as well as in the *dhātus*. When the patient has thus been dieted sufficiently, another course of *snehana* and *svedana* is given.

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[1] "Synthesis of amino acids into cellular protein is carried out with the aid of special enzymes which involve transfer of oxidative energy through phosphorylation. Hydrolysis of proteins in cells occurs through enzymes known as cathepsins. The direction or preponderance of this enzymatic activity depends upon a number of factors, among which are the concentration of amino acids ,pH temperature, oxygen tension, source of energy and quantity and condition of coenzymes concerned with the utilisation of energy through oxidative process, the presence or absence of toxic or deleterious substance and the influence of certain hormones." (W. S. Hoffman: The Biochemistry of Clinical Medicine : p. 14 : The Year Book Publishers Chicago, Edition 1954).

These are calculated to promote the digestion, oxidation and separation of any residual waste product as may be still present in the system, they are brought to the liver and large intestine through the circulation and eliminated by *virecana* (purgatives). The patient is again dieted and given a course of *snehana* and *svedana*, followed by a course of *nirūha* and *anuvāsana bastis* alternatively. These are calculated to the restoration of the structural integrity and functional efficiency of this portion of the *koṣṭha* which is specially important for the promotion of the integrity of the *vāta* organisation of the body with substances required for its normal functioning.

The foregoing brief review is meant to invite attention to the importance attached by Āyurveda to the *koṣṭha* and *śakhā*, among the three *roga-mārgas*. It will be of interest to note that the category *śākhā* includes, in modern parlance, different kinds of tissues such as *rakta* (blood tissue), *māmsa* (muscular tissue), *medas* (adipose tissue), *asthi* (bone and cartilage tissues) *majjā* (especially, *sarakta medas* or red bone marrow, the hemopoietic tissue), *śukra* (the tissue concerned with the production of male reproductive elements and its counter part in females) and the skin which is an epithelial tissue. These tissues are of fundamental importance. As regards the *koṣṭha* and its *aṅgāni* (parts)[1], they constitute a complete system, each part being intimately related to the other and, they perform, as pointed out elsewhere, digestive and metabolic functions in addition to the excretory.

The description of the three *rogamārgas* also bears a (superficial) resemblance to the tissues and/or organs evolved from the three primary embryonic layers viz., ecto, meso and endo derms, corresponding to tissues and/or organs included under each *rogamārga*[2].

The implications of the three *rogamārgas* need a detailed and separate study. However, the relation in which *koṣṭha* and the *ābhyantararogamārga* stands to the other two *rogamārgas* has already been discussed. This *mārga* is important in the context of the *pañcakarma* therapy.

SECTION V

DISEASE PROCESS AND KRIYĀKĀLA

Aetiological factors of diseases are many and varied. They have, generally, been classified under three main categories viz., *asātmyaendriyārthasamyoga*, *prajñāparādha* and *pariṇāma*. Suśruta has classified diseases from the point of view of different kinds of causes viz., *ādhyātmika* (those operating from within or endogenous), *ādhibhautika* (those operating from without-physical, biological and psychological or exogenous) and *ādhidaivika* (providential dispensations, mainly meterological and unpredictable natural catastrophes)[1]. In other words, Suśruta's classification of diseases, proceeds on the tacit acceptance of three broad-based aetiological factors, referred to above.

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[1] पञ्चदश कोष्ठाङ्गानि । (Caraka : Sārīra : 7 ; 10)

[2] It is of significance to note that recent method of classification of the tissues of the body proceeds on the basis of their embryological origin. Thus, three types of embryonic tissues viz., ectodermal, mesodermal and endodermal have been described in the recent times.

Regardless of the nature of and the category to which the *nidāna* (aetiological) factors may belong, the factors of the body which react by an unsettlement of their equilibrium, leading either to the re-establishment of a new steady-state or, if unable to achieve this state, exhibit abnormal states of functioning are, in the view of Ayurveda, the *tri-doṣas*. The normal equilibriated state of these factors of the body has been described as *doṣasāmya* (*prakṛti* or *arogatā*) and their disturbed equilibrium as *doṣaviasmya* (*vikāra or roga*). The way in which doṣas react to produce diseases or, the disease process, has been described under six *kriyākālas* by Suśruta. *Dalhaṇa* has described the *kriyākāla* as *cikitsāvasara*[2].

Any disease, does not matter which category of aetiological factors operate from outside or inside, should, in this view, proceed to develop, according to a known pattern, with this difference that the inception and evolution of disease-process, in the case of *nija* diseases, are stated to begin generally from within and proceed to spread in consecutive steps or phases viz., *sañcaya*, *prakopa*, *prasara*, *sthāna samśraya*, *vykati* and *bheda*. In the case of *agantuja* diseases, the initial process may be an *abhighāta*, (trauma or assault) operating from outside; this may comprise of biological, physical and psychological assaults from the environment which may result in an immediate local reaction, followed sooner or later, by further developments conforming to the pattern described by Suśruta. In any case, the *modus operandi* to be followed in the treatment, are nearly identical in the sense that it is to be commenced, having regard to the relationship in which *koṣṭha* and *sākhā* stand to each other.

The pattern of the evolution of the disease-process proceeds, according to Suśruta, in the following six consecutive stages of steps :—

(i) *Sañcaya or the first kriyākāla*

The initial stage of morbidity or *sañcaya* of the *doṣa* concerned, relates to is stagnation or stasis in its own *sthāna* (site) where, it is stated to congeal, i.e., instead of freely circulating through its own channels (*srotāmsi*) i. e., it stagnates[3]. From the classical description of this stage furnished by Suśruta, it is seen that the symptomatology of this stage is ill-defined and vague—more subjective than objective and possibly functional. The table[4] no. II furnishes the symptomatology of the *caya* of each *doṣa :*

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[1] तच्च दुःखं त्रिविधम्–आध्यात्मिकम्, आधिभौतिकम्, आधिदैविकमिति । (Suśruta : Sūtra : *24* ; 4)

[2] संहतिरूपा वृद्धिश्चयः विलयनरूपा वृद्धिः प्रकोपः ।
(Ḍalhaṇa on Suśruta : Sūtra : *21* ; 18)

[3] एतानि खलु दोषस्थानानि:, एषु संचीयन्ते दोषाः ।
(Suśruta : Sūtra : *21* ; 18)

[4] based on Suśruta : Sūtra : *21* ; 18

Table II

Symptomatology of Sañchaya Stage

Vāta	*Pitta*	*Kapha*
1. *Stabdha koṣṭhatā* (a feeling as though there is no movement in the abdomen)	1. *Pītāvabhāsatā* (yellowishness of the part involved)	1. *Gaurava* (a feeling of heaviness of the limbs)
2. *Pūrṇa koṣṭhatā* (a sense of fullness of the abdomen)	2. *Mandoṣmatā* (slight rise of temperature)	2. *Ālasya* (langour)

An important feature of this *kriyākāla* is said to be an aversion to causes due to which *caya* has taken plade.[1] According to Suśruta, this is exactly the stage when the development of the disease process can be averted, arrested or prevented. Stated in modern phraseology, this phase would correspond to the stage of early pathogennsis where, measures to ensure specific protection are to be adopted. The measures referred to above should, obviously be of the *doṣa pratyanīka* or *doṣaviparīta type.* Thus, the *saṁśodhana* measures, as may have to be adopted for the purpose, should be *basti, virecana* and *vamana* respectively, for the *caya* of *vāta, pitta* and *kapha.* The same principle applies to diet therapy also.

The need to recognise this stage and administer prompt treatment has been forcibly brought home by Suśruta thus : "the deranged doṣas checked or subdued in their sañcaya state fail to exhibit any further or subsequent development but, if left unrecognised, they assume strength and intensity in the course of their further development."[2]

2. *Prakopa or the second Kriyākāla*

If, for any reason, the stage mentioned above has either been neglected or ignored, or badly handled, the respective exciting causes of *doṣas* serving as stimuli, may make for the loosening of the congealed *doṣas*, their swelling and excitement in their own sites.[3]

The tables furnish details relating to the provocative causes-*āhāra*, *vihāra* and *caryā*—of *doṣas* and their symptomatology, in this stage.

It is to be noted, in this connection, that the provocative causes of *rakta* are the same

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[1] चयकारणविद्वेषश्चेति ।

(Suśruta : Sūtra *21* ; 18)

[3] संचयेऽपहृता दोषा लभन्ते नोत्तरा गतीः ।
ते तूत्तरासु गतिषु भवन्ति बलवत्तराः ॥

(Suśruta : Sūtra *21* ; 37)

[2] विलयनरूपा वृद्धिः प्रकोपः ।

(Ḍalhaṇa on Suśruta : Sūtra : *21* ; 18)

Table III Provocation Causes of Doṣas

(A) VĀTA PRAKOPAṆĀNI[1]	(B) PITTAPRAKOPAṆANI[2]	(C) KAPHA PRAKOPAṆANI[3]	(D) RAKTA PRAKOPAṆANI[4]
1. *Āhāra :* Ingestion of food, predominantly *kaṭu, kaṣāya* and *tikta* rasas ; *laghu ;* dry ; *śtīavīrya ;* dried leafy-vegetables ; *vallūra ; varāka ; uddālaka ; karaduṣa ; śyāmāka nīvāra ; mudga ; masūra ; ādaki ; hareṇu ; kalāya ; niṣpāva ;* overeating and irregular meals.	1. *Āhāra: :* Ingestion of food, predominantly *kaṭu, amla* or *lavaṇa,* tīkṣṇa, uṣṇavīrya, *laghu, vidāhi, tilataila ; tilapinyakā ; kulathā, sarṣapa, atasī ;* the green leafy vegetable known as *harītaka ;* flesh of *godhā ;* curd ; whey ; *kūrcikā; amlaphala ; katvarā* and *vidagdhajīrṇa* (leading to fermentative changes).	1. *Āhāra :* Ingestion of food substances, essentially *guru* and slimy ; *amla* and *lavaṇarasas ;* substances which increase the secretion of *kapha ;* food grains such as *hayanalla, yavaka, nihatha, itchata* and *māṣa : godhūma ; tila ;* rice cakes ; curd ; milk and *kṛśara ; pāyasa* preparations of cane-sugar ; flesh of beasts and birds of aquatic habits or those which live in swampy regions ; lard ; bulbus and lotus stems ; *kaśeruka ; sṛṅgāṭaka ; madhuraphala* and *vallīphala,* foods consisting of unwholesome substances ; cold foods and drinks.	1. *Āhāra :* Frequent meals ; repeated use of food composed of substances possessing *śītavīrya ;* liquids ; *guru* and *snigdha ;* the consumption of indigestible or incompatiable food substances ; eating before the completion of the digestion of the food eaten previously.
2. *Vihāra :* Wrestling with persons of superior strength ; violent exercises ; sexual excesses ; excessive study ; headlong plunge into water or a leap from great height ; running ; leaping over a ditch ; bounding gait ; swimming ; keeping late hours ; carrying heavy loads ; excessive riding ; walking long distances ; suppression of natural urges, *viz.* micturition, dafaecation, tears, secretions from the nose, snezzing etc.	2. *Vihāra :* Mental ; anger, grief, fear and fright. Physical : Unnatural modes of sexual indulgence and excessive exposure to the sun.	2. *Vihāra :* Day-sleep ; lazy and sedentary habits ; eating before the digestion of food previously consumed.	2. *Vihāra :* Day-sleeping ; anger ; exposure to the glare of the sun or fire ; over-fatiguing labour and trauma.
3. *Caryā :* Fasting.	3. *Caryā :* Fasting.	3. *Caryā, seasonal & climatic factors :* Morning ; evening ; *hemanta* and specially *vasanta ;* after meals.	3. *Caryā, seasonal & climatic factors :* Same as for *pitta doṣa.*
4. *Seasonal and climatic factors :* Cold, cloudy and windy days ; winter and rainy seasons ; evening and the final stages of digestion.	4. *Seasonal & climatic factors :* Summer and autumn ; noon ; midnight and during the process of digestion.		

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[1] Based on Suśruta : Sūtra : *21* ; 19.

[2, 3 & 4] Based on Suśruta : Sūtra : *21* ; 21-25.

as those of *pitta* and its time (kāla) of *prakopa* is similar to that of *doṣas.*[1]

The lines of treatment proposed for[2] this phase are obviously, the same i.e., *saṁśodhana* as for the previous stage, since the *prakupita* or excited *doṣas* are still confined to their own sites and have not spread over.

3. *Prasara or the third Kriyākāla.*

Again, if the process of disease has not been tackled at its *prakopa* stage, suitable exciting causes operating upon the condition, the process moves on to the third stage, described as *prasara.* It is seen that causes which were responsible for the *prakopa* stage are also effective in advancing this stage to that of *prasara.* The term, *prasara,* is itself self-explanatory and it means spreading. By implication, the *doṣas* which, in the previous stage, have been loosened, swollen and excited in their own sites now overflow or spill over. In so doing, they invade different parts of the body, especially, those other than their own-*vimārgagamana.*[3] It is seen that *rakta* is also vitiated in the process and *vāyu*[4] is responsible for moving the *doṣas* throughout the body.[4] The spread of *doṣas* may relate to any one or two or all the three together. Suśruta has furnished the possible permutations and combinations of them which are as in the table V.[5]

Table IV

Symptomatology of *Prakopa* Stage[6]

Vāta	Pitta	Kapha
1. Koṣṭhatoda (abdominal pain)	1. *Amlikā* (acid erucation)	1. *Annadveṣa* (aversion to food)
2. Koṣṭhasañcaraṇa (movement of gas in abdomen)	2. Pipāsā (thirst)	2. Hridayotkleda (nausea)
	3. Paridāha (burning sensation)	

Table V

Kinds of Prasāra

Single *Doṣa*	Combination of two *doṣas*	Combination of three or four *doṣas*
1. *Vāta*	1. *Vāta-pitta*	1. *Vāta-pitta and śoṇita*
2. *Pitta*	2. *Vāta-śleṣmā*	2. *Vāta-śleṣmā* and *śoṇita*
3. *Kapha*	3. *Pitta-śleṣmā*	3. *Pitta-śleṣmā and śoṇita*
4. *Śoṇita*	4. *Vāta-śoṇita*	4. *Vāta-pitta and kapha*
	5. *Pitta-śoṇita*	5. *Vāta-pitta-kapha* and *śoṇita*
	6. *Śleṣmā-śoṇita*	

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[1] पित्तप्रकोपणैरेव चाभीक्ष्णं × × असृक् प्रकोपमापद्यते।
यस्माद्रक्तं विना दोषैर्न कदाचित् प्रकुप्यति ।
तस्मात्तस्य यथादोषं कालं विद्यात् प्रकोपणे ॥
(Suśruta : Sūtra : *21* ; 26)

[2] तयोर्विलयनरूपवृद्धया वृद्धा दोषाः संशोधनेन निर्हर्तव्याः।
(Ḍalhaṇa on Suśruta : Cikit : *33* ; 3)

[3] उद्रिक्तानां प्रसरो भवति।
(Suśruta : Sūtra : *21* ; 28)

[4] तेषां वायुर्गतिमत्वात् प्रसरणहेतुः सत्यप्यचैतन्ये ।
स हि रजोभूयिष्ठः, रजश्च प्रवर्तकं सर्वभावानाम् ॥
(Suśruta : Sūtra *21* ; 28)

[5] Based on Suśruta : Sūtra : *21* ; 28.

[6] Based on Suśruta : Sūtra : *21* ; 27.

These *doṣas*, whether circulating throughout the body or in a part of it may, ultimately become lodged in a particular part, bading to the inception of the disease in that locality or, in the alternative, the *prakupita doṣas* may remain quiescent, coating as it were the internal pathways of the body. They may exacerbate to cause diseases as and when they are excited by suitable and powerful exciting causes.[1]

Symptomatology of the *prasara* stage involving the spread of *doṣas*, to places other than their own, is furnished in the table VI.[2]

The principle of treatment suggested for this stage is as follows.

> If the *prakupita vāta* has spread over to the site of *pitta*, the line of treatment is as for the *sthānika pitta*. On the other hand, if the *pitta* has spread over to any of the sites of *kapha*, the line of treatment is as for the *sthānika-kapha*. Ever so, if *kapha* has spread over to any of the sites of *vāta*, the line of treatment is as for *sthānika vāta*.[3]

The implications of this principle are followings. In the case of number one above, *virecana* as a *śodhana* measure or the administration of *ghṛta* as a *śamana* measure may have to be adopted. In the case of *pitta* spreading to the *kaphasthāna*, *vamana* on the *śodhana* side is the treatment of choice and the use of *madhu* is its palliative treatment. If *kapha* spreads to the *vātasthāna*, *basti* as *śodhana* and *taila* as *śamana* may have to be used. It is, of course, implied that the choice of drugs either for *śodhana* or *śamana* are matters of detail.[4]

Table VI
Symptomatology of the Prasara stage

Vāta	*Pitta*	*Kapha*
1. *Vimāryagamana* (movements in pathways other than its own)	1. *Oṣa* (localised sensation of heat)	1. *Arocaka* (aversion to food-anorexia)
2. *Āṭopa* (painful rumbling sensation in the abdomen)	2. *Coṣa* (sucking pain)	2. *Avipāka* (indigetion)
	3. *Paridāha* (burning pain)	3. *Aṅgasāda* (inertness of limbs)
	4. *Dhūmāyana* (belching or vomiting attended with the smell of somke)	4. *Cardi* (vomiting)

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[1] कृत्स्नेऽर्धेऽवयवे वाऽपि यत्राङ्गे कुपितो भृशम् ।
दोषो विकारं नभसि मेघवत्तत्र वर्षति ॥
नात्यर्थं कुपितश्चापि लीनो मार्गेषु तिष्ठति ।
निष्प्रत्यनीकः कालेन हेतुमासाद्य कुप्यति ॥
(Suśruta : Sūtra : *21* ; 29-30.)

[2] Based on Suśruta : Sūtra *21* ; 32.

[3] तत्र वायोः पित्तस्थानगतस्य पित्तवत् प्रतिकारः, पित्तस्य च कफस्थानगतस्य कफवत्, कफस्य च वातस्थानगतस्य वातवत्, एष क्रियाविभागः ।
(Suśruta : Sūtra *21* ; 31.)

[4] शरीरजानां दोषाणां क्रमेण परमोषधम् ।
बस्तिर्विरेको वमनं तथा तैलं घृतं मधु ॥
(Aṣ. Hṛ : Sūtra : *1* ; 25)

4. *Sthānasamśraya or the fourth Kriyākāla :*

Evolutive stages described above are still considered to be in the formative phase or sub-clinical level—the actual manifestation of the disease proper begins with the fourth *kryākāla*, described as *sthānasamśraya.* This stage synchronises with the appearance of *pūrvarūpa* or prodromal symptom. This phase would appear to be the one in which definite pathological lesions are initiated in the site where the spread of *prakupita-doṣas* have become arrested-*saṅga*—due to the impairment of their channels of circulation-*srotovaiguṇyam.* This has been described elsewhere in some detailed. Prodromal symptoms that manifest, in this stage, are not only indicative of the *doṣas* involved and the nature of *doṣa-dūṣya samūrcchana* as may take place but also the nature of the disease which is yet to manifest fully.

The line of treatment to be adopted in this condition, according to Ḍalhana, is for both the *doṣas* and *dūṣyas.*[1]

By implication, *doṣas* have already reacted with the one or the other of the *dūṣyas* (*or dhātūs*) that comprise the *śākhā*. The logical approach to the treatment should, therefore, aim at the *pācana* of *doṣas* (*malas*) which have reacted with the *dūṣya* or *dūṣyas*, as the case may be , and to clear the related *srotāmsi* of obstruction-*saṅga*-and promote the elimination of the *doṣa* or *doṣas* concerned, through the *koṣṭha* by *vamana, virecana* and *basti-karmas.*[2] I tmay be noted here that, as a consequence of the *doṣa-dūṣya samūrcchana*, both *doṣas* as well as *dūṣyas* are to be deemed as *malas.*[3] Measures referred to above conduce to the prevention of further developments of the disease process into a well defined disease-syndrome.

5. *Vyakti or the fifth Kriyākāla*

If suitable preventive and curative measures were not adopted even at the stage, mentioned above, the disease-process may proceed on to the next stage, known as *vyakti*. In this stage, the disease, with its characteristic symptomatology, is stated to fully manifest. The treatment of this stage, should be both *doṣapratyanīka* and *vyādhi-pratyanīka*, depending upon the severity of the *vyādhi* (disease) and the strength of the *doṣas* involved.[4]

6. *Bheda or the sixth Kriyākāla*

The stage mentioned above, may lead on the next stage, known as *bheda*, in which *vyādhimukti* or the termination of the disease by cure may occur, leading to convalescence, or, it may tend to become chronic-*dīrgha-kālānubandhi*[5] or become complicated-*upadrava*-or serve as the *nidāna* for other diseases *nidānārthakararoga* or may end in death.

The lines of treatment of this stage will be largely conditioned by the nature of the turn which the diseases may take. If it ends in *vyādhimukti,* efforts should be made to gradually rehabilitate the patient to normal health by *santarpaṇa* measures. *Upadravas,* if they are prominent, may have to be first attended to. Otherwise, the treatment of the main disease may be pursued to mitigate complications.[1] In case, the disease becomes, *dīrghakālānubandhi,* then both the cause and effects of the disease should be treated. Where, the disease becomes the *nidānārthakararoga* for other diseases, the new ones should be treated.

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[1] चिकित्सा चात्र दोषस्य दूष्यस्य चेत्युभयाश्रिता चिकित्सा।
(Ḍalhaṇa on Suśruta : Sūtra : *21* ; 33

[2] वृद्धया विष्यन्दनात्पाकात्स्रोतोमुखविशोधनात् ।
शाखां मुक्त्वा मलाः कोष्ठं यान्ति वायोश्च निग्रहात् ॥
(Caraka : Sūtra : *28* ; 33)

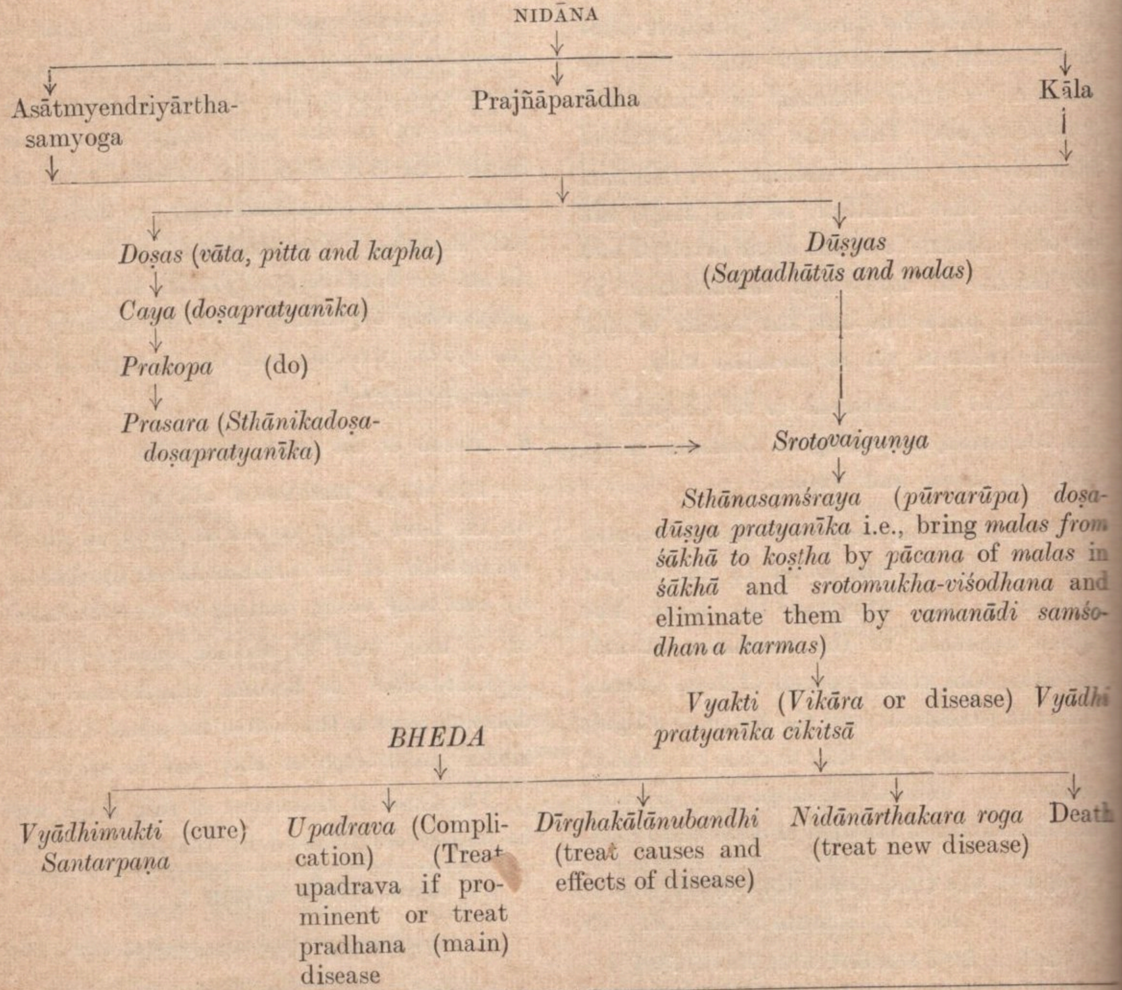
[3] Refer footnote no. 4 p., 15

[4] तत्र व्याधिप्रत्यनीकैव चिकित्सा ।
(Ḍalhaṇa on Suśruta : Sūtra : *21* ; 34)

[5] षष्ठः क्रियाकालः, ज्वरातिसारप्रभृतीनां च दीर्घकालानुबन्धः ।
(Suśruta : Sūtra : *21* ; 35)

A schema that envisages the different steps and events of the evolutive phases of the disease process and principles of treatment therefore are furnished hereunder :—

DYNAMICS OF KRIYĀKĀLA AND PRINCIPLES OF CIKITSĀ


NIDĀNA
Asātmyendriyārtha-samyoga
Prajñāparādha
Kāla
Doṣas (*vāta, pitta and kapha*)
Caya (*doṣapratyanīka*)
Prakopa (do)
Prasara (*Sthānikadoṣa-doṣapratyanīka*)
Dūṣyas (*Saptadhātūs and malas*)
Srotovaiguṇya
Sthānasamśraya (*pūrvarūpa*) *doṣa-dūṣya pratyanīka* i.e., bring *malas fro* *śākhā to koṣṭha* by *pācana* of *malas* i *śākhā* and *srotomukha-viśodhana* an eliminate them by *vamanādi samśo-dhana karmas*)
Vyakti (*Vikāra* or disease) *Vyādh* *pratyanīka cikitsā*
BHEDA
Vyādhimukti (cure) *Santarpaṇa*
Upadrava (Complication) (Treat upadrava if prominent or treat pradhana (main) disease
Dīrghakālānubandhi (treat causes and effects of disease)
Nidānārthakara roga (treat new disease)
Deat

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[1] (१) तस्य प्रायः प्रधानप्रशमे प्रशमो भवति । (Caraka : Cikit. : *21* ; 40)
(२) तेषां प्रधानप्रशमे प्रशमोऽशाम्यतस्तथा । पश्चाच्चिकित्सेतूर्णं वा बलवन्तमुपद्रवम् ॥
(Aṣ. Hṛd. : Sūtra : 12-62)

The foregoing discussion of the evolutive disease-process is meant to help the physician to diagonose the disease at a time when it can be effectively aborted or averted. It envisages two distinct aspects of the disease-process viz., formative sub-clinical and manifest clinical. Suśruta has very clearly stated that "He who knows fully about *sancaya, prakopa prasara, sthānasamsraya, vyakti* and *bheda* is alone entitle to the claim of being a physician[1]."

The concept of *kṛiyākāla* is comprehensive and aims at the preservation of health, the prevention and cure of disease. The bearing it has on the *pañcakarma* therapy or *samśodhana cikitsā* has been brought out at every step.

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[1] संचयं च प्रकोपं च प्रसरं स्थानसंश्रयम् । व्यक्तिं भेदं च यो वेत्ति दोषाणां स भवेद् भिषक् ॥
(Suśruta : Sūtra : *21*; 36)

Chapter Four

PAÑCAKARMA THERAPY

SECTION I

GENERAL SURVEY OF MEASURES OF CIKITSĀ

The term *cikitsā,* which is derived from the root *'kit-rogāpanayane'* effectively expresses the therapeutic outlook of Āyurveda. The meaning of the root, mentioned above is, 'kit'—to adopt measures calculated to the removal of the factors of the disease. Sanskrit lexicons, like the *Amarakoṣa,* have described this term as *'ruk-pratikriyā'* Bhanujī Dikṣita has defined this term as *rujah-pratikriyā nirasanam,* meaning, the removal of pains by measures antagonistic to them. Even so, *Vaidyaka-śabdasindhu* has described *cikitsā* as *roganidāna-pratīkāra,* meaning, treatment against the cause of disease. The *vyutpattis* and *niruktis* cited above draw attetion to the main outlook of cikitsā viz.,

(*a*) the elimination of morbid factors that cause disease ;

(*b*) treatment antagonistic to the disease and the

(*c*) treatmet that aims at the elimination of the cause of the disease.

Āyurveda has defined the term cikitsā in several contexts. Some of them, which are relevant to and have a direct bearing on this topic are :—

(1) "That therapy which contributes to the maintenance of the concordance of śarīra dhātus, is cikitsā[1]",

(2) "That is *cikitsā* which, with the aid of *bhiṣak* or physician and the other three *pādas* (limbs) possessing requisite qualities, brings about the normalcy of the *dhātus,* where their normalcy has been disturbed".[2]

(3) According to Suśruta, "measures calculated to the removal of the causative factors of disease is *cikitsā.*[3]"

The above apart, Caraka has indicated the precise objects which cikitsā seeks to achieve under the comprehensive term *'bheṣaja'* which has been described by him as having two aspects viz. : (*a*) *'svasthasyojaskaram kiñcit'* i.e., the promotion and preservation of health, strength and longevity in the *svastha* or healthy person and, (*b*) *'kiñcidārtasyaroga nut'* or the cure of disease in the ailing and afflicted.[1] The first object, which is generally meant for healthy persons, for the maintenance of their health, promotion of longevity and vitality is sought to be achieved by *rasāyana* and *Vājīkaraṇa* therapies. They have, in addition, an application to those that are afflicted by diseases.[2]

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[1] याभिः क्रियाभिर्जायन्ते शरीरे धातवः समाः । सा चिकित्सा विकाराणां कर्म तद्भिषजां स्मृतम् ॥
(Caraka : Sūtra : *16* ; 34)

[2] चतुर्णां भिषगादीनां शस्तानां धातुवैकृते । प्रवृत्तिर्धातुसाम्यार्था चिकित्सेत्यभिधीयते ॥
(Caraka : Sūtra : *9* ; 5

[3] सङ्क्षेपतः क्रियायोगो निदानपरिवर्जनम् । (Suśruta : Uttaratantra *1* ; 26)

The second object i.e., the cure of disease in the ailing and the afflicted is achieved by *saṁśodhana, saṁśamana* and *nidānaparivarjana*.[3] In the reverse direction, *saṁśodhana* measures are also applicable to healthy persons, especially, as preparatory measures to *rasāyana* and *vājīkaraṇa* therapies.[4]

The curative aspect of *cikitsā* is seen to have been described by Caraka, under three main headings viz., *daivavyapāśraya, yuktivyapāśraya* and *satvāvajaya*.[5] *Daivavyapāśraya* is the therapy by which divine powers are invoked by the use of mantras (incantations), *auṣadhi* (potent herbs and medicaments), *maṇi* (precious gems), *maṅgala* (propitiations), *niyama* (vows), *prāyaścitta* (ceremonial penitence), *upavāsa* (fasts), *svastyayana* (prostration) and *praṇipātagamana* (pilgrimage) etc.[6]

Satvājaya method of treatment relates to the treatment of mental disturbances. It involves the restraint of the mind from desire for unwholesome objects and the cultivation of *Jñāna, vijñāna, dhairya, smṛti* and *samādhi*.[7]

Yuktivyapāśraya is the third aspect of *Cikitsā*. It relates directly to the preventive and, more particularly, the curative aspects of *cikitsā*. It includes dieting and medicaments.[8] The last mentioned aspect of *cikitsā* is immediately germane to this thesis.

The term *yukti* has been defined as that faculty of the mind which weighs and analyses various factors at work in a given phenomenon, having regard to the past, present and future.[9] Again, *anumāna*, in its different aspects viz., inferrential-deductive, inductive, and analogical reasoning, depends upon *yukti*.[10]

Vyapāśraya means, "specially dependent upon." In other words, *yuktivyapāśraya* proceeds on the basis of observed facts of a case, subject the same to crucial scientific analysis, having regard to theory, experience and the practice of the science and art of medicine.

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[1] × × × × भेषजं द्विविधं च तत् ।
स्वस्थस्योर्जस्करं किञ्चित् किञ्चिदार्तस्यरोगनुत् ।।
(Caraka : Cikit : *1* ; 1-4)

[2] स्वस्थस्योर्जस्करं यत्तु यद्वृष्यं तद्रसायनम् ।
प्रायः, प्रायेण रोगाणां द्वितीयं प्रशमे मतम् ।।
प्रायः शब्दो विशेषार्थो ह्युभयं ह्युभयार्थकृत् ।।
(Caraka : Cikit : *1* ; 1-5 & 6)

[3] Refer Footnote No. 2 Page 2

[4] Refer foot note no 2 Page 5

[5] त्रिविधमौषधमिति दैवव्यपाश्रयं युक्तिव्यपाश्रयं सत्त्वावजयश्च ।
(Caraka : Sūtra : *11* ; 54)

[6] Caraka : Sūtra : *11* ; 54

[7] (१) सत्त्वावजयः-पुनरहितेभ्योऽर्थेभ्यो मनोनिग्रहः ।
(Caraka : Sūtra : *11* ; 54)
(२) मानसो ज्ञानविज्ञानधैर्यस्मृतिसमाधिभिः ।
(Caraka : Sūtra : *11* ; 58)

[8] युक्तिव्यपाश्र[illegible] पुनराहारौषधद्रव्याणां योजना ।
(Caraka : Sūtra : *11* ; 54)

[9] बुद्धिः पश्यति या भावान् बहुकारणयोगजान् ।
युक्तिस्त्रिकाला सा ज्ञेया त्रिवर्गः साध्यते यया ।।
(Caraka : Sūtra : *11* ; 25)

[10] अनुमानं खल्वपि तर्को युक्त्यपेक्षः ।
(Caraka : Vimāna : *4* ; 4)

Yuktivyapāśraya is seen to comprise three main measures viz., *antah parimārjana, bahih-parimārjana* and *śastrapraṇidhāna.*[1] *Antah-parimārjana* relates to the treatment by internal purification of the body in diseases born of errors and indiscretions of foods and drinks. *Bahih parimārjana* involves external purification by the use, externally, of *abhyaṅga, sveda, pradeha, pariṣeka, mardana* etc. *Śastra-praṇidhāna* relates to the use of surgical measures viz., *chedana, bhedana, vyadhana, dāraṇa, lekhana utpāṭana, prachanna, sīvana, eṣana, kṣara, jaloka* etc.[2]

Leaving aside *śastrapraṇidhāna,* it is seen that the other remaining aspects of *cikitsā.* viz., *antah parimārjana* and *bahih parimārjana* read together with references made to six main therapeutic measures viz., *laṅghanam brihmaṇam, svedanam, stambhanam, vamanam, virecanam, basti* (nirūha) and *śirovirecana,* described under *laṅghana* measures, points to the fact, that *ṣaḍupakramas* or six measures are basic to *kāyacikitsā.*[3]

From Suśruta's point of view, samśodhana (radical removal of morbific factors), *samśamana* (the use of palliatives), āhāra (dietetics) and ācāra, (conduct or regimen) are conducive to the removal of the cases of the disease.[4] *Samśodhana* measures, referred to above, are seen to include *vamana, virecana,* basti (*nirūha* and *anuvāsana*), *śirovirecana* and *raktamokṣaṇa,* reducing, thus, the basic therapeutics measures, to five, i.e., *pañckarmas.*

From Vāghbhaṭa's point of view, measures of *cikitsā* are mainly of two kinds viz., *santarpaṇa* and *apatarpaṇa* or *brimhaṇa* and *laṅghana.*[5] Under *laṅghana* are included the main measures, *rūkṣaṇa* and *svedana,* and *snehana* and *stambhana* under *brimhaṇa. Laṅghana* measure is seen to have two aspects viz., *śodhana* and *śamana.* The *śodhana* aspect of *laṅghana* seeks to eliminate *doṣas* (*malas*) from the body by the following measures : *basti* (*nirūha*), *vamana, virecana, śirovirecana* and *asravisruti. Śamana,* in its turn, is seem to comprise seven measures viz., *pācana, dīpana,* control of hunger, thirst, exercise, exposure to the sun and open-air treatment.[6]

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[1] प्रायशस्त्रिविधमौषधमिच्छन्ति-अन्तःपरिमार्जनं, वहिः-परिमार्जनं, शस्त्रप्रणिधानं चेति ।
(Caraka : Sūtra : *11* ; 55)

[2] (Caraka : Sūtra *11* ; 55)

[3] लंघनं बृहणं [illegible]ले रुक्षणं स्नेहनं तथा ।
स्वेदनं स्तम्भनं चैव जानीते यः स व भिषक् ।।
चतुष्प्रकारा संशुद्धिः पिपासा मारुतातपौ ।
पाचनान्युपवासश्च व्यायामश्चेति लङ्घनम् ।।
दोषाणां बहुसंसर्गात्सङ्कीर्यन्ते ह्युपक्रमाः ।
षट्त्वं तु नातिवर्तन्ते त्रित्वं वातादयो यथा ।।
(Caraka : Sūtra : *22* ; 4, 18, 43)

[4] Refer foot note No. 1 page No. 4.

[5] उपक्रम्यस्य हि द्वित्वाद् द्विधैवोपक्रमो मतः ।
एकः सन्तर्पणस्तत्र द्वितीयश्चापतर्पणः ।।
बृहणो लंघनश्चेति तत्पर्यायावुदाहृतौ ।
(Aṣ. Hṛd : Sūtra : 14 ; 1)

[6] शोधनं शमनं चेति द्विधा तत्रापि लङ्घनम् ।
यदीरयेद्बहिर्दोषान् पञ्चधा शोधनं च तत् ।।
निरूहो वमनं कायशिरोरेकोऽस्रविस्रुतिः ।।
न शोधयति यद्दोषान् समान्नोदीरयत्यपि ।
समीकरोति विषमान् शमनं तच्च सप्तधा ।।
पाचनं दीपनं क्षुतृड्व्यायामातपमारुताः ।
(Aṣ. Hṛd : Sūtra : *14* ; 4-7)

(१) चतुष्प्रकारा संशुद्धिरिति अनुवासनं वर्जयित्वा तस्य बृंहणत्वात् ।
(Cakrapāṇi on Caraka : Sūtra : *22* ; 18)

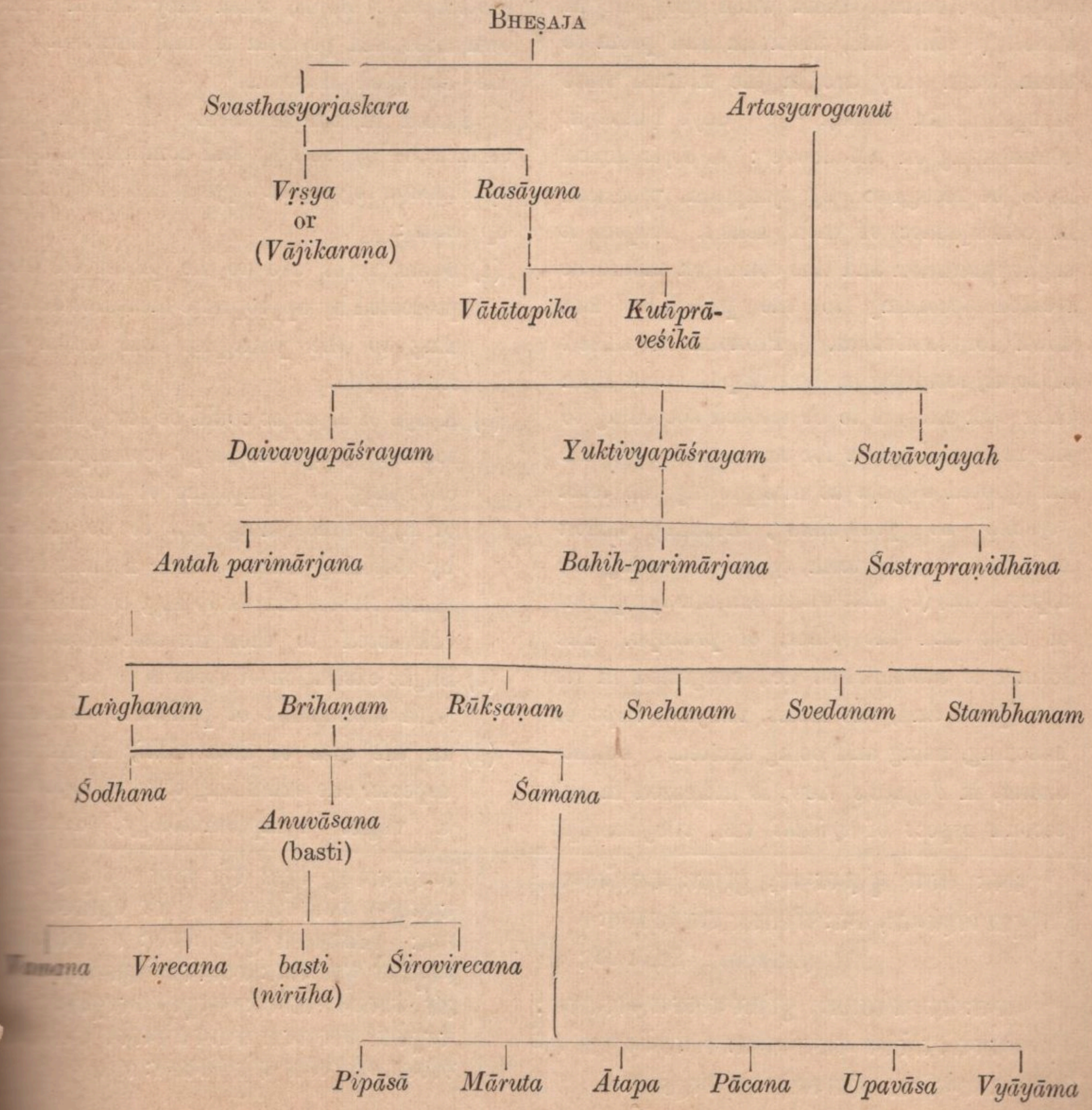
(२) अनुवासनं तु यद्यपि वमनादिवन्न बहुदोषनिर्हरणकारणं भवति, तथाऽपि पुरीषस्य पक्वाशयगतवातस्य च बहिर्निर्हारिकत्वात् (पञ्च) कर्मलक्षणप्राप्तमेव ।
(Cakrapāṇi on Carak, Sūtra *2* ; 15)

Śodhana measures included under *laṅghana* described above, are important from the point of view of this thesis.

The schema below sums up the main measures of *cikitsā* described by Caraka :

SCHEMA

MEASURES OF CIKITSĀ


BHEṢAJA
Svasthasyorjaskara
Ārtasyaroganut
Vṛṣya or (Vājikaraṇa)
Rasāyana
Vātātapika
Kuṭīprāveśikā
Daivavyapāśrayam
Yuktivyapāśrayam
Satvāvajayaḥ
Antaḥ parimārjana
Bahih-parimārjana
Śastrapraṇidhāna
Laṅghanam
Brihaṇam
Rūkṣaṇam
Snehanam
Svedanam
Stambhanam
Śodhana
Anuvāsana (basti)
Śamana
Vamana
Virecana
basti (nirūha)
Śirovirecana
Pipāsā
Māruta
Ātapa
Pācana
Upavāsa
Vyāyāma

SECTION II

THE PRINCIPLES OF SAMŚODHANA THERAPY AND THEIR IMPLICATIONS

The following, stated by Suśruta, sums up the main principles on which cikitsā revolves. Says Suśruta, "Promote the increase of *doṣas* where they have suffered a deficit (*kṣaya*), sedate them when they are excited (*kupita*), eliminate them when they are in surfeit (*vṛddhi*) and, maintain and promote them when they are in the normal state of equilibrium (*sama*)."[1] Says Ḍalhaṇa, commenting on the above : "A *doṣic* deficit is to be recognised by symptoms produced in consequence of their deficit. *Kupita* is slight excitation and this condition should be treated according to the principles laid down for *samśmana.* Pronounced surfeit of *doṣas*, resulting in their displacement from their own sites, is to be treated according to the rules laid down for *samśodhana*."[2] He has quoted *Jejjaṭa* as interpreting the term "*vṛddha*" as "*pravṛddha*", meaning, surfeit in excess and, the term, *vṛddhi* as having two aspects viz., (*a*) that which exhibits symptoms of *caya* and the other, of *prakopa*. The former is *samhatirūpa* i.e., congealed in its own place and, the latter, *vilayana rūpa* or lossening, rising and being excited. *Samśodhana*, in *Jejjaṭa's* view, is indicated in the second aspect of *vṛiddhi* viz., *vilayanarūpa vṛddhi*. Likewise, the term *kupita* is of two kinds viz., *cayapūrvaka* and *acayapūrvaka*. *Samśodhana* measures, according to rules prescribed for them, are to be applied for *cayapūrvaka kopa*. The preservation and protection of *doṣas*, when they are in their own sites and perform normal functions, is the accepted doctrine.[3]

Stated in simple terms, the principles enunciated by *Suśruta* and commented upon by *Ḍalhaṇa* relying on *Jejjaṭa*, can be summed up thus :

(1) *Sama doṣas* are to be preserved and protected by appropriate measures according to the principles laid down in *svasthavṛtta*.

(2) *Kṣaya* of *doṣas* as could be recognised by related symptomatology corresponding, obviously, to symptoms of their *kṣaya* or hypo-functioning, has to be treated by restoring them to their normal functional states, that is to say, by measures calculated to their increase-*brimahaṇa*.

(3) Slight excitation of *doṣas* is to be treated with *samśamana* or palliative measures.

(4) In the case of *doṣavṛddhi*, in its tw aspects, one exhibiting *caya lakṣaṇa* viz. a vague symptomatology, describe

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[1] दोषाः क्षीणा बृंहयितव्याः, कुपिताः प्रशमयितव्याः, वृद्धा निर्हर्तव्याः, समाः परिपाल्या इति सिद्धान्तः।
(Suśruta : Cikit : *33* ; 3)

[2] क्षीणाः क्षयलक्षणैर्ज्ञाताः। कुपिता अल्पतया कोपमापन्नाः संशमनविधानेनैव प्रशमयितव्याः। प्रकर्षेण वृद्धा स्वस्थानाच्चलिताः संशोधनविधिना निर्हर्तव्याः।
(Ḍalhaṇa on the above)

[3] जेज्जटाचार्यस्तु प्रवृद्धा इति पठति। वृद्धिर्हि द्विवि
चयलक्षणा प्रकोपलक्षणा च। तत्र संहतिरूपा वृ
श्चयः। विलयनरूपा वृद्धिः प्रकोपः। तयोर्विल
रूपवृद्धया वृद्धा दोषाः संशोधनेन निर्हर्तव्याः। कु
इति कोपोऽत्र द्विविधः चयपूर्वकोऽचयपूर्वकश्च,
चयपूर्वकं कोपमागता संशोधनविधानेन शर्मायतव्या
स्वस्थानस्था रक्ष्या इति सिद्धान्तः।
(Jejjaṭa on the above, quoted by Ḍalhaṇ

elsewhere, may have to be treated, obviously, with *samśamana* or palliative measures. On the contrary, *vilayana* type of *vṛddhi,* spoken of as *prakopa,* has to be treated by *śodhana* measures.

(5) In the case of *doṣa kopa,* in its two aspects, one *cayapūrvaka* and the other, *acayapūrvaka,* the former has to be treated with *samśodhana* measure and the latter, with *samśamana* measures.

Since this thesis is mainly concerned with *samśodhana* or depletory measures, the principle which is relevant to it is *vṛddhānirhartavyā* (*vilayana rūpav ṛddhi* or *cayapūrvaka-kopa*). The schema which sums up the principles of *cikitsā* discussed above, is presented separately.

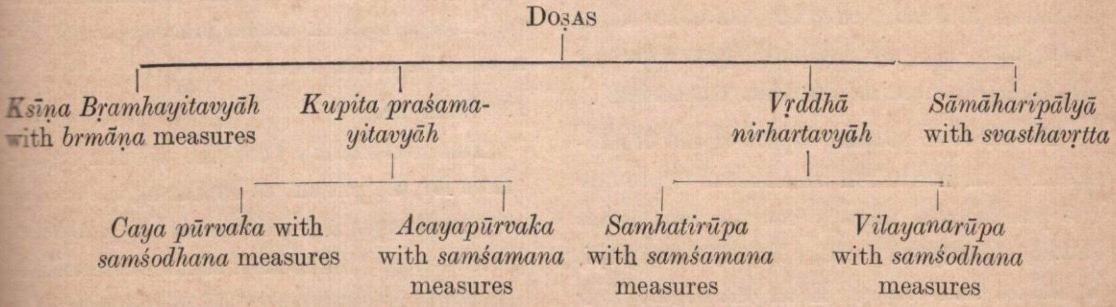
Vāghbhaṭa is seen to have concerned with the principle of *samśodhana* enunciated above, as could be seen from his observation that, "A treatment which eliminates is known as *śodhana*. This is of five kinds viz., *basti, vamana, kāyavirecana, śirovirecana* and *asravisruti*[1]."

It may be noted here that, while Caraka has not included *śirā vyadha* as one of the five main *pañcakarma* measures and laid emphasis on the dictum that *basticikitsā* is half of *Cikitsā*[2]. Suśruta is seen to have included *śirā vyadha* as one of the important *śodhana* measures. He has emphasised the importance of this method of treatment as constituting fifty percent of Cikitsā[3]. Vāghbhaṭa is seen to have echoed Caraka's views on *basti,* referred to above, while including *asravisruti* also, as one of the five measures.

The difference between the two schools of thought is comparable to the difference in the outlooks of a physician and a surgeon.

In this thesis, the author has confined himself to the following two *karmas* viz., *vamana* and *virecana,* among the five *karmas,* preceded by *pūrvakarma* i.e., *snehana* and *svedana* followed by *samsarjanakrama,* as these can be applied practically and studied in the hospital attached to the Post-graduate Training Centre in Āyurveda, Jamnagar.

CIKITSĀ SIDDHĀNTA


DOṢAS
Kṣīṇa Bṛmhayitavyāḥ with bṛmāṇa measures
Kupita praśamayitavyāḥ
Vṛddhā nirhartavyāḥ
Sāmāharipālyā with svasthavṛtta
Caya pūrvaka with samśodhana measures
Acayapūrvaka with samśamana measures
Samhatirūpa with samśamana measures
Vilayanarūpa with samśodhana measures

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[1] यदीरयेद्वहिर्दोषान् पञ्चधा शोधनं च तत् ।
निरूहो वमनं कायशिरोरेकोऽस्रविस्रुतिः ॥
(Aṣ. Hṛd : *14* ; 5)

[2] Caraka has referred to a contemporary opinion, according to which *basti* is the entire treatment, and also तस्माच्चिकित्सार्धमिति ब्रुवन्ति सर्वां चिकित्सामिति बस्तिमेके ।
(Caraka : Siddhi : *1* ; 39)

[3] सिराव्यधश्चिकित्सार्धं शल्यतंत्रे प्रकीर्तितः ।
यथा प्रणिहितः सम्यग्वस्ति, कायचिकित्सिते ॥
(Suśruta : Ṣārīra : *8* ; 23)

Organisational Aspect

Since *ṣaḍupakramas* (six measures) or their later development of the *pañcakarma* therapy which, as pointed out earlier in the introduction, ruled supreme as basic to the treatment of all diseases till the times, when its supremacy was challenged by advances made in *rasaśāstra,* the organisation of a institution meant for carrying out these treatments, in those days, are seen to have involved considerable thought and planning.

That this was so, is seen from the Chapter entitled *Upakalpanīya* in the *Sūtrasthāna* of the *Carakasamhitā*. Every physician, according to this *samhitā,* should have arrangements for these treatments in a well planned building, located in all ideal locality, free from din and dust, provide for every facility that a hospital may need such as spacious wards, provision for water storage, accommodation for preparing medicines, kitchen, bathrooms, latrines, properly staffed with competent nursing and ancillary personnel, make provision for the entertainment of the patients and other requirements as may be needed for *snehana, svedana, vamana, virecana* etc., while also making adequate provision for emergency as well as for after treatments[1].

The more important aspect of the organisation of an institution which seeks to provide the *pañcakarma* therapy are the four *pādas* (limbs)—*catuṣpāda* viz., *bhiṣak, dravyāṇi, upasthātā* and *rogi*[2]. Each one of the four *pādas,* should possess at least four qualfications referred to below[3]:

(1) *Bhiṣak* (physician) should possess a clear grasp of theoretical knowledge, wide practical experience, skill and purity of body and mind.

(2) *Dravyāṇi* (drugs), there must be an abundant supply of drugs of dependable and valuable qualities, wide applicability, prepared in many forms and by different processes.

(3) *Upasthātā* (nurse) should possess knowledge of nursing, skill in the art, affection (and sympathy) for the patient and be clean in body (and mind).

(4) *Rogi* (patient) should possess memory, be obedient to instructions, courageous and be able to describe his ailments.

Appertinances

In addition to drugs and prepared medicaments as may be required in connection with *snehana, svedana, vamana, virecana basti, Śirobasti* etc., the following apparatuses or appertinances required in connection with *pindsweda (navara-kizi), dhārā, basti* and *śirobasti,* which are, now-a-days, in actual practice in Kerala, need a mention here.

1. *Taila droṇī*

This is a shallow boat-like wooden contrivance for the patient to lie during the course of such special treatments as *pindsveda* (*navaɹ—a-kizi*'). The most reliable reference to this *droṇî* is available in *Dhārākalpam*[4].

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[1] Caraka : Sūtra *9* : 3

[2] भिषग्द्रव्याण्युपस्थाता रोगी पादचतुष्टयम् ।
गुणवत्कारणं ज्ञेयं विकारव्युपशान्तये ॥
(Caraka : Sūtra : *9* ; 3)

[3] Caraka : Sūtra : *9* ; 6-9

[4] (*i*) द्रोणी हस्तचतुष्कदीर्घकरमात्रव्यासतत्पादमा–
त्रोधत्भित्तियुता दृढ़ा समतला पादान्तरन्ध्रा वहिः ।
शीर्षस्थान इहोन्नतैककरमात्रातानविस्तारका
निम्ना किंचन मध्यतश्च चरणैहस्तैश्च युक्ता दढ़ैः ॥
(Dharakalpam)

2. *Dhārāpātram*

Dhārāpātram is the vessel to be used for different kinds of *dhārā* viz., *taila, ksīra, takra* etc. Its capacity should be sufficient to hold not less than two *prasthas* (64 oz.) of *dhārā-dravya* and must be shallow, 5" or 6" in depth,

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(ii) The measurements of *droṇi*, referred to above are given hereunder. (Figure no. 1).

"It is better wrought from a single piece of wood 11 feet 9 inches by 2 feet 9 inches by 9 inches. From either end, mark off a length of 9 inches and carve out the four rounded handles near the bottom at the four corners, each having a diameter of two inches. Leaving a margin of 2½ inches width allround scoop out the whole surface of 10 feet by two feet to 6 inches until the margin around stands 1½ inches above it every where. Then the inner space is divided into two main compartments, the anterior compartment or the head—end having a space of 3 feet 6 inches (including a cross ridge) by 2 feet of 6 inches and the posterior compartment or the body portion having a space of 7 feet 6 inches y 2 feet 6 inches. Now in the anterior portion, mark off a length 2 feet 4½ inches from the inner edge of the margin at the border and draw a line across at the point of the marking. Beyond, this, towards the leg end draw another line parallel to this at a point 1½ inches from it. The space between these two lines is for a partition ridge for separating the anterior compartment from the posterior compartment and also for giving a comfortable seat for the neck of the patient during the treatment.

The anterior compartment or the head portion as it may be called having a space of 2 feet 4½ inches by 2 feet. 6 inches is again divided into two distinct parts, one being a level platform 11 inches wide at the farther end towards the head portion and the other being sloping plane of 1 foot 5½ inches wide from the bottom of the partition ridge towards the head-end platform as shown in the sectional elevation plan. Here in the head-end, platform, scoop out a circular hemispherical sink of 10 inches diameter and 6 inches depth such that the sink commences at a point 2 inches away from the bordering rim at the head-end. The sink should protrude one inch into the sloping part below the head-end platform. This projection of the sink into the sloping platform facilitates an easy flow of the liquid coming down the slope to the sink from the portion near the marginal cross-ridge which separates the head portion from body compartment. The space between the cross ridge and the circular sink may now be planed with a slight slope so that all the liquid drippings from the head of the patient may drain into the sink. The space on the other sides of the sink may be left quite level for placing small vessels, towels and other accessories required for the treatment.

"The body compartment may now be scooped on gradually sloping towards the foot end to a depth of 7½ inches at the farther end of the basin where an outlet is bored through the marginal rim possesses wide mouth and curved bottom. It is seen that, according to the *guru-śiṣya* tradition of Kerala, any one of the materials viz., glass, silver, gold, earth, porcelain or any one of the woods mentioned in connection with taila droni, may be used for the purpose.[1]

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to let out wastes and drippings that may accrue during the course of the treatment.

Now the anterior compartment and the posterior portion of the basin may be made perfectly smooth and comfortable for the patient to lie down upon. The partition ridge is also rounded off and smoothened with a concave depression 6 inches long and ½ inch deep in the middle for a comfortable neck rest.

At last four round cylindrical bed rests of a 4 inches diameter and 2 inches thick are to be fixed at the four corners underside, for the basin to rest on the floor.

When the basin is used for other forms of treatment than *Dhāra* for the head, the anterior or the head portion and the sink therein are of no service and in such cases a soft pillow is placed just above the partition ridge, in the sloping platform, for the patient's head to rest upon."

(iii) The following types of woods have been recommended for making *droṇi* in *Dharākalpam*." Since Mangifera Indica or Mango tree is easily available everywhere in India and cheap, it may be used exclusively." (MOSS : Āyurvedic treatment of Kerala p. 71-74)

प्लक्षोदुम्बरगन्धसारवरणन्यग्रोधदेवद्रुमा:
पुन्नागाह्वकपित्थचोचबकुलाशोकासनाम्रास्तथा ।
डोलाचम्पकबिल्वनिम्बखदिरामोधाग्निमन्थार्जुना
इत्याद्यन्यतमेन सेचनविधौ द्रोणीं प्रकुर्यात् बुध: ।।

[1] (i) धाराभा: स्फटिकसुवर्णरजतप्लक्षादिपूर्वक्त–
वृंक्षामस्ताम्रवराटिकाप्रथितमृत्पात्रास्त्वतीवोत्तमा: ।
केचिद्रोणीकाष्ठिकान्तविवरं शंसन्ति केचित्तु वा
तत्पर्वोपमविस्तृंतं तु सुपिरं पात्रस्य मध्ये कृतम् ।।
द्विप्रस्थप्रमितो विधाय इति वा मध्यस्थरन्ध्रादयो
गच्छद्धर्तिरथोर्ध्वलम्ब्यपि घट: कार्य: शिरस्सेचने ।।
(ibid quoted by -Moss P. 75)

(ii) "Dhārāpatram is to be suspended just over the head of the patient by means of suitable cords tied round the rim of the vessel, taking care that the supporting cords should never pass underneath the basin (Fig. no. 2). A small hole, just sufficient to admit the tip of the little finger of the patient about ½ inch in diameter, is to be bored neatly at the centre of the bottom of the vessel. A small hard hemispherical hollow wooden cup, preferably a half of the hard endocarp of the cocoanut fruit, having a similar corresponding hole in its bottom at its centre and corresponding to the hole in the basin and with ridged edges is placed over the hole in the earthen ware Dhārā vessel with its mouth downwards. Through the hole of the wooden cup is passed a wick or a string of loose cotton-threads with a free end of about four inches coming out through the hole in the basin. The threads of the wick should be packed only just firmly as not to slip off the hole but loose enough to permit a continuous and regular dropping of the liquid that is poured in the basin, for the treatment. The inner free and of the string should be secured from falling out with the help of a small wooden wedge as shown in the figure no. 2.

PLATE II

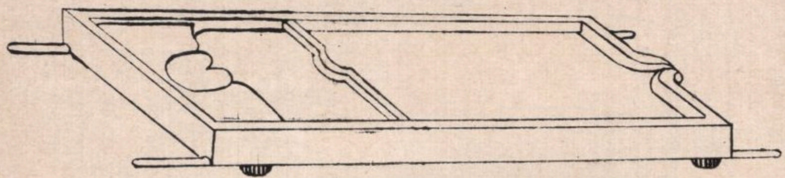
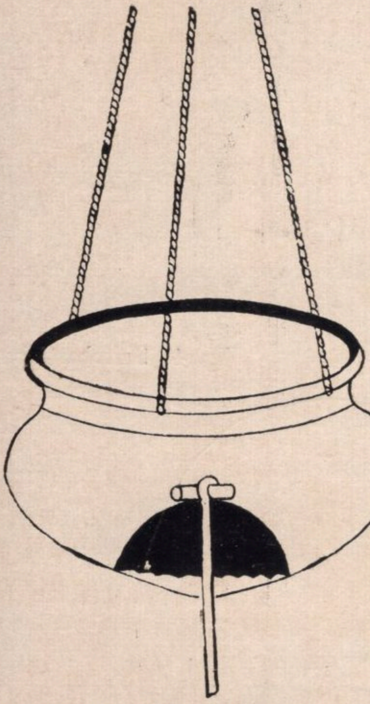
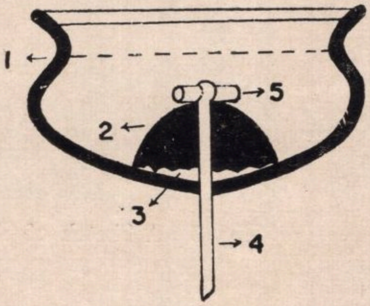


Fig. 1 Taila Droni (General View)



Dhāra Pātram
(General view when suspended)



Dhāra Pātram
(Vertical Section)

1. Drāra Pātram.
2. Hollow Wooden cup.
3. Ridged edge of the wooden cup.
4. String of loose cotton threads.
5. Wooden Wedge from which the string is hanged.

Fig. 2

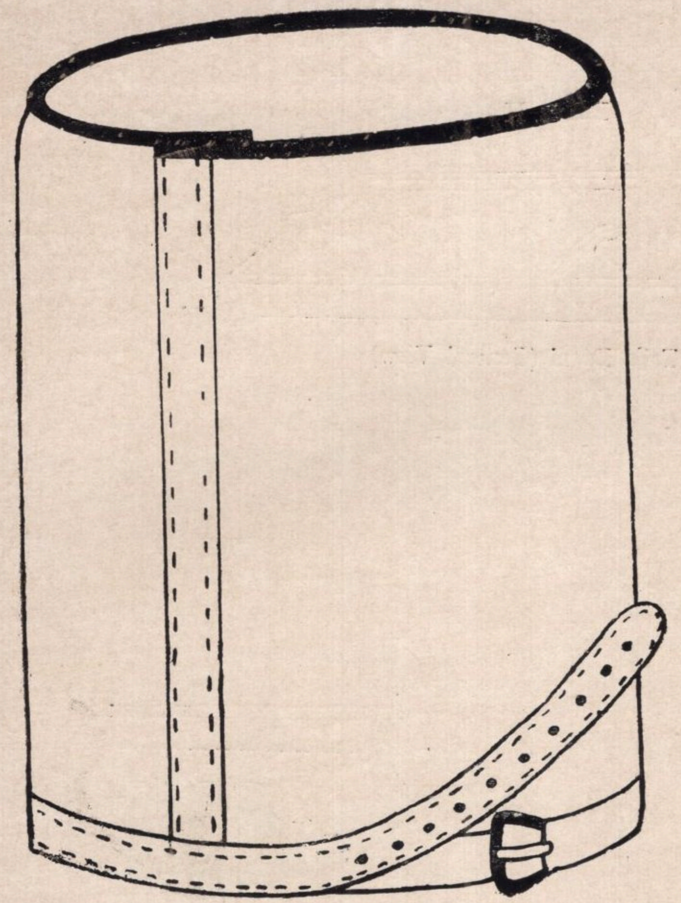


Fig. 3 A Sketch of Shirobasti

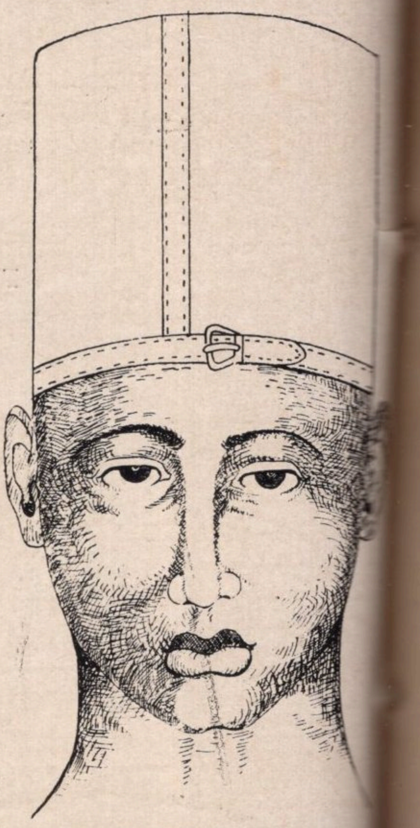


Fig. 4 Shirobasti in use

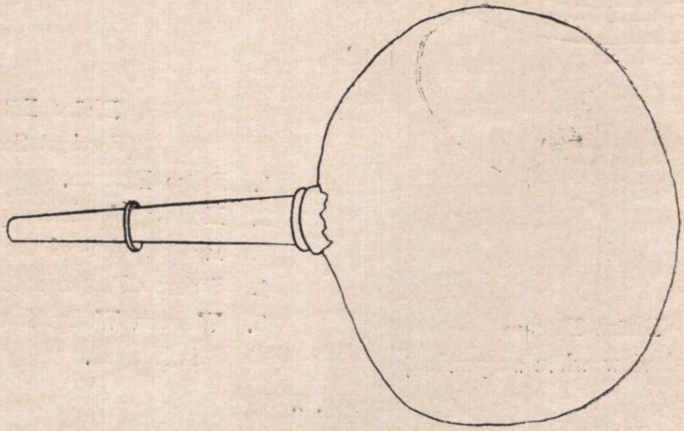


Fig. 5 Bastiyantra Just Before use

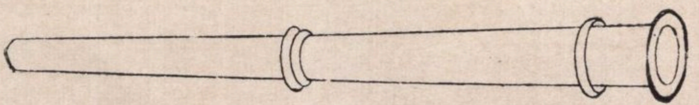


Fig. 6 Bastinetra

3. *Śirobasti*

To perform this basti, a leather strap, twelve *aṅgula* in width and the length, in keeping with the circumference of the head of the patient and a tape to tie round and a paste of *maṣa* for keeping it in position on the head like a cap,[1] are necessary. In practice, the skin of Ox or Buffalo is usually used for this purpose. *Śirobasti* is widely used in Kerala for *śirorogas* especially of *vātic* origin. (Figure no. 3 & 4).

4. *Bastiyantra*

Bastiyantra comprises two parts viz., *basti* and *netra*. The *basti* part of it is the bladder of a goat, sheep or buffalo. It must be strong, properly tanned, without smell or perforation, neither thick nor thin. The urethral portion of the bladder should be sufficiently wide to attach the *netra* and tie the two together with a strong string. In the alternative, a thick cloth among others, can also be used.[2]

The *netra* part of *bastiyantra* corresponds to an enema cannula. It can be made of gold or such other metals, wood, bone or bamboo. In general, it should resemble the tail of a cow with a tapering end and wider base. It is a tubular apparatus with rounded limb and smooth surface. Another difference between *bastinetra* and enema cannula, relates to the manufacturing of the former to suit patients of different ages-both infants and aged persons.[3] The tables I and II below furnish measurements of the *netra*, according to age, as mentioned by Vāgbhaṭa and commented upon by Aruṇdatta :

Table I

Length of *Netra* [4]

Age	*Length*
Below 1 year	5 aṅgula
2-6 years	6
7-11 years	7
12-15 ,,	8
16-20 ,,	9
Above 20 years	12

Table II

The Lumen of the *Netra* [5]

Age	*Diameter at the root*	*Diameter at the rectal end*
Below 1 year	1 *aṅgula*	size of a *mudag*
1-6 years	1 ,,	,,
7-11 years	1¼ ,,	,, *māṣa*
12-15 years	1½ ,,	,, *kalāya*
16 years	1¾ ,,	,, *wet kalāya*
17 years	2 ,,	,, ,,
18 years	2¼ ,,	,, ,,
19 years	2½ ,,	,, ,,
20 years	2¾ ,,	,, ,,
21 years	3 ,,	,, *karkandhu*

Karṇikā :

In order to prevent undue penetration of the *bastinetra* deep into the rectum, a *karṇikā* or rim has to be made on the *netra* at the rectal end. At the required point above, two *karṇikās* are provided in the *netra* at a distance of two *aṅgulas* between one another to tie the *basti.*[1] A sketch of the *netra* which is usually used in adults in Kerala is presented in figures nos. 5 & 6.

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[1] द्वादशांगुलविस्तीर्णं चर्मपट्टं शिरःसमम् ।
आकर्णबन्धनस्थानं ललाटे वस्त्रवेष्टिते ॥
चैलवेगिकया बद्ध्वा माषकल्केन लेपयेत् ।
ततो यथाव्याधिशृतं स्नेहं कोष्णं निषेचयेत् ॥
(Aṣ. Hṛd : Sūtra : 22-18)

[2] Caraka : Siddhi *3* ; 10-12 ;
Aṣ. Hṛd : Sūtra : *19* : 15-17

[3] (ibid 7 and ibid 9-10)

[4] Aṣ. Hṛd : Sūtra : *19* ; 10-12

[5] Aṣ. Hṛd : Sūtra : *19* ; 13-14 & Aruṇadatta on the above

Seasons :

The administration of *pañcakarma* measures is seen to need a tolerably bearable climate and suitable seasonal conditions. Generally speaking, considerations of season in respect of these treatments may arise in the case of healthy people. Ordinarily, in such cases, *saṃṣodhana* treatment for *doṣas* which have attained *caya* in *Grīṣma, Varṣā* and *Hima ṛtus,* should be undertaken in the month of *Śrāvaṇa, kārtika* and *Caitra.* Nonetheless, since *Grīṣma* represents a very hot season, *Varṣā* an extremely moist season due to heavy rains and *Hima,* an extremely cold period, the ideal time for undertaking *śodhana* for *doṣas* which have attained *caya* are the *ṛtusandhis.*[2]

The undertaking of *samśodhana* therapy in *ṛtusandhis* is of importance. *Ṛtusandhi* represents the period of transition between the outgoing and incoming seasons—seven days on either side and fourteen days in all. Biologically speaking, this is a significant period, for, it represents exactly the duration required by the organism to gradually adapt itself to the stresses of incoming season. By the same token, it may be said that *śodhana* measures for the removal of *doṣas* which have attained *caya* towards the end of the outgoing season are beneficial and the organism is thus enable to tide over the stresses of the incoming season and protect itself against susceptibility to seasonal diseases.

Regardless of the foregoing, it is of course, understood that *samśodhana* measures may have to be undertaken at any time, having regard to the nature of diseases as may occur in any season. Suitable precautions are, however, to be taken to counteract the effects of the heat of *Grīṣma,* rains of *Varṣā* and chill of *Śarat ṛtus,* together with *samyoga, samskāra,* quanitity and the preparation of medicine proposed to be employed for the purpose [3]

TYPES OF DISEASES SUITABLE FOR SAMŚODHANA THERAPY

Laṅghana treatment, as a whole, may have to be administered in diseases, shown below :

1. *Meha roga*
2. *Āma doṣa*
3. *Atisnigdha*
4. *Jvara*
5. *Ūrustambha*
6. *Kuṣṭha*
7. *Visarpa*
8. *Vidradhi*
9. *Plīhāroga*
10. *Śiroroga*
11. *Kaṇṭharoga*
12. *Akṣiroga*
13. *Sthaulya*

In addition to the above, *samśodhana* measures are indicated in persons in whom any one of the undermentioned conditions are prominent viz., *sthaulya, bala, pittādhika* and *kaphādhika.*[4]

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[1] (Aṣ. Hṛd. : Sūtra : *19* ; 14-15)

[2] श्रावणे कार्तिके चैत्रे मासि साधारणे क्रमात् ।
ग्रीष्मवर्षाहिमचितान् वाय्वादीनाशु निर्हरेत् ॥
अत्युष्णवर्षशीता हि ग्रीष्मवर्षाहिमागमाः ।
सन्धौ साधारणे तेषां दुष्टान् दोषान् विशोधयेत् ॥
स्वस्थवृत्तमभिप्रेत्य, व्याधौ व्याधिवशेन तु × × ।

(Aṣ. Hṛd. : Sūtra : *13* ; 33-35)

[3] आत्ययिके पुनः कर्मणि काममृतुं विकल्प्य कृत्रिमगुणोपधानेन यथर्तुगुणविपरीतेन भेषजं संयोगसंस्कारप्रमाणविकल्पेनोपपाद्य प्रमाणवीर्यसमं कृत्वा ततः प्रयोजयेदुत्तमेन यत्नेनावहितः ।

(Caraka : Vimāna : *8* ; 127)

[4] Aṣ. Hṛd : Sūtra : *14* ; 10-12

SECTION III

PŪRVAKARMA

The terms *pūrvakarma, pradhānakarma* and *paścātkarma* have been used by Suśruta in the chapter on *Agropaharaṇīya* or preliminary measures of the *Sūtrasthāna* of his *saṁhitā* in respect of surgical treatments.[1] He is, however, seen to have also meant these measures to be applied in the treatment of diseases comprehended by *kāyacikitsā* or internal medicine also.

Ḍalhaṇa, in his commentary, has cited different other views on this subject. According to one such view, measures which commence with *laṅghana* and ending with *vireka* should constitute the *pūrvakarma* of *vraṇacikitsā*. In this view, *pātana* or opening of *vraṇa* or the promotion of healing of *vraṇa*, constitutes the *pradhānakarma* and measures applied, thereafter, for the promotion of *bala, varṇa* and *agni*, constitute the *paścātkarma*. According to another view, *pācana, snehan,* and *svedan,* are the *pūrvakarmas* while, *vamana, virecana, basti, nasya* and *śiramokṣaṇa* constitute the *pradhānakarma* and *peyadisamsārjanakarma* constitutes the *paścātkarma*. According to still others, the treatment administered during subclinical formative stages of the disease viz., from *caya* to *pūrvarūpa* i.e., *sthānasaṁśraya,* constitute the *pūrvakarma* and the treatment of the disease proper is *pradhānakarma*. Rehabilitation treatment after *vyādhimukti*, constitutes *paścātkarma*.[2]

It is thus seen that, even during the time of Ḍalhaṇa, the need to extend the use of these terms viz., *pūrva, pradhāna* and *paścāt karmas,* in the context of both preventive and prophylactic medicine, on the one hand and the curative, on the other, referred not only in the treatment of surgical diseases but also for those included under *kāyacikitsā* proper, was recognised.

In general, the term *pūrvakarma* refers to preparatory measures i.e., the treatment that preceds the main specific treatment. In this thesis, the term *pūrvakarma* is used in the sense of the second view noted above. In other words, this term refers to *sneha* and *sveda karmas.*[3]

Prior to the administration of *saṁśodhana* measures, the patient has to be prepared suitably with *pācana* and *dīpana sneha* and *sveda* as suggested by Vāgbhaṭa. According to then *saṁśodhana cikitsā* should not be undertaken straightway when *sāmadoṣas* which have permeated throughout the *dhātus* of the body are unable to clear out by themselves. Such an attempt seldom gives the desired result-an attempt which is comparable to "the extraction of the juice from an unripe or raw fruit. Any such attempt may harm the body itself".[1]

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[1] त्रिविध कर्म–पूर्वकर्म, प्रधानकर्म, पश्चात्कर्मेति ।
(Suśruta : Sūtra : *5* ; 3)

[2] तत्रैके, 'लंघनादि विरेकान्तं पूर्व कर्म व्रणस्य च । पाच(ट)नं रोपणं यच्च प्रधानं कर्म तत् स्मृतम् । बलवर्णाग्नि-कार्यन्तु पश्चात्कर्म समादिशेत्' इति । अन्ये तु, संशोध्यस्य पाचनस्नेहनस्वेदनानि पूर्व कर्म, वमनविरेचन वस्ति-नस्यशिरामोक्षणानि प्रधानकर्म, पेयाद्यन्नसंसर्जनं पश्चात् कर्म; अपरे तु चयादीनां पूर्वरूपान्तमामातङ्कोत्पत्तेः प्राक् यत् क्रियते तत् पूर्वकर्म, आतङ्कोत्पत्तौ यत् तत् प्रधानकर्म, निवृत्तातङ्कस्यानुबन्धोपचरणाय यत् तत् पश्चात् कर्म ।

(Ḍalhaṇa on Suśruta : Sūtra : *5* ; 3)

[3] स्नेहमग्रे प्रयुंजीत ततः स्वेदमनन्तरम् ।
स्नेहस्वेदोपपन्नस्य संशोधनमथेतरत् ।।

(Caraka : Sūtra : *13* ; 99)

"All such cases may have to be treated primarily with sneha which promote *pācana* and *dīpana.* This is to be followed by *svedana* which will cause the *sāmadoṣas* (*malas*) to attain *pakva. Samśodhana,* when administered after the *sāmadoṣas* (*malas*) have become *pakva,* paying due regard to the time of administration, *doṣas* can then be eliminated through the nearest pathways from the *koṣṭha*".[2]

In practice, however, Kerala vaidyas prefer the administration of such *pācana* and *dīpana kaṣāyanas* as *pañcakola kaṣāya, dasamūlakaṭutraya kaṣāya, rāsnādisaptaka kaṣāya* as pre-*pūrvakarma* treatment.

1. SNEHANA

Both Suśruta and Vāgbhaṭa have vividly described the benefits of the regular use of *sneha* thus: "Benefits that accrue to a person who regularly resorts to *sneha* are the proper functioning of *jaṭharāgni,* the cleansing of the *koṣṭha,* the proper development of the *dhātus,* the promotion of body strength (and resistance to disease) and complexion (in keeping with the nature of the subject), the promotion of the integrity (and strength) of the *indriyās,* the prevention of and the non-showing of aging in the aged and enable the enjoyment of the benefits of life".[3]

Caraka has, in addition, drawn pointed attention to the value of *sneha* in the clearance and elimination of *doṣas* (malās) that have accumulated in the body as below :—

"*Sneha* destroys abnormal *vāta,* renders the body soft and clears the accumulated *malas* which have obstructed the *srotāmsi*".[4]

QUALITIES OF SNEHA DRAVYAS.

It is necessary at the outset, to take note of the qualities of *snehadravyas* and of them, the best that possess these qualities. Both Caraka and Vāgbhaṭa have described *drava, sūkṣma, sara, snigdha, guru, śitala, manda* and *mṛdu* as qualities which *sneha dravyas* should possess. Caraka has, in addition, included picchila, as an extra quality of *sneha dravyas.*[5] The authors of the

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[1] सर्वदेहप्रविसृतान् सामान् दोषान् न निर्हरेत् ।
लीनान् धातुष्वनुत्क्लिष्टान् फलादाम्राद्रसानिव ॥
आश्रयस्य हि नाशाय ते स्युर्दुर्निर्हरत्वतः ।
(Aṣ. Hṛd : Sūtra : *13* ; 29)

[2] (१) पाचनैर्दीपनैः स्नेहैस्तान् स्वेदैश्च परिष्कृतान्
शोधयेच्छोधनैः काले यथासन्नं यथाबलम् ॥
(Aṣ. Hṛd : Sūtra : *13* ; 29)

(२) तान्युपस्थितदोषाणां स्नेहस्वेदोपपादनैः ।
पञ्चकर्माणि कुर्वीत मात्राकालौ विचारयन् ॥
(Caraka : Sūtrta : *2* ; 15)

[3] दीप्तान्तराग्निः परिशुद्धकोष्ठः प्रत्यग्रधातुर्बलवर्णयुक्तः ।
दृढेन्द्रियो मन्दजरः शतायुः स्नेहोपसेवी पुरुषो भवेत्तु ॥

[4] स्नेहोऽनिलं हन्ति मृदू करोति देहं, मलानां विनिहन्ति
सङ्गम् ।
(Caraka : Siddhi : *1* ; 7)

[5] द्रवं सूक्ष्मं सरं स्निग्धं पिच्छिलं गुरु शीतलम् ।
प्रायो मन्दं मृदु च यद् द्रव्य तत्स्नेहनं मतम् ॥
(Caraka : Sūtra : 22 ; 15)

samhitā granthas have described *ghṛta, majjā, vasā,* and *taila* as the best among *snehadravyas.* Of these, *ghṛta* is considered to be the best since, even when used in the preparation of many medicaments, it is still stated to retain its own innate qualities, *albeit* it nonetheless imbibes the qualities of drugs used in preparations.[1] It is seen, that notwithstanding the foregoing, the four *snehadravyas,* referred to above, are increasingly beneficial from the last to the first in their *pittāhara* (anti-*pitta*) property ; likewise, commencing from *ghṛta* and ending with *taila,* these *dravyas* are increasingly valuable in the treatment of remaining two *doṣas* viz., *vāta* and *kapha.* As regards *gurutwa, taila* is considered to be better than *ghṛta, vasā* superior to *taila* and *majjā* better than *vasā.*[2]

It is seen, in addition, that *sneha dravyas,* mentioned above, are to be used, each in a particular season viz., *taila* in *varṣā, ghṛta* in *śarat,* and *vasā* and *majjā,* in *vasanta.*[3]

Snehadravyas have been classified by Caraka and Suśruta, from the point of view of their source viz. (*a*) *sthāvara* (vegetable) and (*b*) *jaṅgama* (animal).[4] This classification is significant. The relative advantage of the two would appear to be more in favour of the latter than the former. This preference of *snehas* of animal origin over those of the vegetable, would appear to be based on biological considerations. These *dravyas,* represent lipids, which have been metabolically synthesised and stored in animals or enter the composition of cellular systems as parts of their structural make up often linked with proteins (lipoprotein) or compose the plasma cell-membrane or obtain as inclusions for utilisation for energy purposes. In other words, *snehas* of animal origin are the exact homologues of the *śārīrika medas, vasā, majjā,* or, that which obtains in the milk from which *ghṛta* is made. They, therefore, possess the advantage of *dravya sāmānyata,* whereas, the *sneha* obtained from vegetable sources have to be broken down, in the course of *jaṭharāgnipāka* and synthesised, again, as animal fat viz., *vasā, majjā, medas,* etc., in the course of *dhātvagnipāka.* They can, at best, be treated as possessing *guṇa*—and *karma sāmānyatva.* In addition, fatty substances, such as those, under reference, derived from animal sources may permeate the finest pores of the channels of circulation—the *srotāmsi*-relatively with greater ease. The *sūkṣmaguṇa* ascribed to *snehas,* which have a value in therapeutics, obviously, refers to their capacity to permeate extremely subtle pores or *srotomukhāni.* This view is based on the definition of *sūkṣma guṇa* furnished by Suśruta viz., it is the quality by virtue of which the substance concerned can permeate through the finest of *srotāmsi.* Kaviraj K. L. Bishagratna has interpreted the term srotamsi employed in this context by sukṣhma as smallest capillaries and channels of the body.[1]

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[1] सर्पिस्तैलं वसा मज्जा सर्वस्नेहोत्तमा मताः ।
एभ्यश्चैवोत्तमं सर्पिः संस्कारस्यानुवर्तनात् ॥
(Caraka : Sūtra : *13* ; 13)

[2] पित्तघ्नास्ते यथापूर्वमितरघ्ना यथोत्तरम् ।
घृतात्तैलं गुरु वसा तैलान्मज्जा ततोऽपि च ॥
(Aṣ. Hṛd : Sūtra : *16* ; 3)

[3] सर्पिः शरदि पातव्यं, वसा मज्जा च माधवे ।
तैलं प्रावृषि, नात्युष्णशीते स्नेहं पिबेन्नरः ॥
(Caraka : Sūtra : *13* ; 18)

[4] स्नेहानां द्विविधा चासौ योनिःस्थावरजङ्गमा ।
(ibid 9)

The main objects of *sneha* therapy is to gain access to the innermost recesses of the body, to digest, separate and cleanse not only the *srotomukhāni* but also the *sthāyi dhātus* where *malasañcaya has taken place.*

INDICATIONS AND CONTRA-INDICATIONS OF SNEHAKARMA

The indications and contra-indications for the administration of *snehakarma*, as could be gathered from the three main classics of Āyurveda, are furnished in the talbe III [2]

Table III

Indications and Contraindications of *Snehakarma*

Indications			Contra-ndication			
1. *Swedya*	(Ca.,	Aṣ)	1. *Atisthūla*	(Ca.,	Su.,	Aṣ.)
2. *Samśodhya*	,,	,,	2. *Tṛiṣita*	,,	,,	,,
3. *Rūkṣa*	,,	,,	3. *Mūrchita*	,,	,,	,,
4. *Vātavikara*	,,	,,	4. *Aruci*	,,	,,	,,
5. *Vyāyāmasevi*	,,	,,	5. *Chardyardita*	,,	,,	,,
6. *Madyasevī*	,,	,,	6. *Madātura*	,,	,,	,,
7. *Strīnitya*	,,	,,	7. During and after *nasya*, *basti* and *virecana*	,,	,,	,,
8. *Cintaka*	,,	,,	8. *Klāmayukta*	(Ca.,	Su.)	
9. *Vṛddha*		(Aṣ.)	9. *Urustambha*	(Ca.,	Aṣ.)	
10. *Bālaka*		,,	10. *Utsannakapha*	,,	,,	
11. *Nirbala*		,,	11. *Abhiśyānānnanagudā*	,,	,,	
12. *Kṛṣa*		,,	12. *Mandāgnya*	,,	,,	
13. *Raktakṣīṇa*		,,	13. *Udararogī*	,,	,,	
14. *Śukrakṣīṇa*		,,	14. *Āmadoṣi*	,,	,,	
15. *Abhiśyandī*		,,	15. *Garapīdita*	,,	,,	
16. *Timirapīḍita*		,,	16. *Durbala*	,,	,,	
			17. *Apaprasūtā*	(Su.,	Aṣ.)	
			18. *Abhiṣyanda*	(Ca.,)		
			19. *Mahādoṣa*	,,		
			20. *Mrāmapīdita*	,,		
			21. *Garbhiṇī*	,,		
			22. *Tāluśoṣi*	,,		
			23. *Snehamlāna*	,,		
			24. *Ajīrṇī*	(Su.)		
			25. *Taruṇa jvara*	,,		
			26. *Akāle*	,,		
			27. *Durdine*	,,		
			28. *Atitikṣṇāgni*	(Aṣ)		
			29. *Galarogī*	,,		

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[1] Suśruta : Sūtra : *46* ;

[2] Caraka : Sūtra : *14* ; 52-56 ; Suśruṭa : 31 ; 46-48 and Aṣ. Hṛd. : Sūtra *16* ; 4-8)

DIURNAL ADMINISTRATION OF SNEHA DRAVYAS

Special rules have been laid down for the administration of *snehas*, which are important. In seasons, described as *sādhāraṇa*, which comprise *Śrāvaṇa*, *Kārtika* and *Caitra māsas*, the administration of *snehas* must be carried out during the day when the sun is shining brightly. In case, the administration of *taila* is deemed necessary, *sneha* substance may be administered even in *śita* (*Hemanta*) and *Śiśira ṛtus*. Likewise, *ghṛta* can be administered during the night time of *Grīṣma ṛtu*. In diseases of *pitta*, *vāta*, and samsarga of *pitta* viz., *vātapitta* or *śleṣmāpitta*, *ghṛta* should be used, invariably, during the night. Vāgbhaṭa has cautioned against the administration of *snehas*, in contravention of the rules referred to above ; such a practice, if carried out, during the night may lead to disturbances involving *vāta*, and *kapha* and the use of *taila* or others, during the day time may lead to the causation of *pitta* diseases.[1]

GENERAL MODE OF ADMINISTRATION OF *SNEHA*

Sneha can be administered through the medium of different kinds of food as *basti*, *nasya*, *abhyaṅga*, *añjana*, *gaṇḍūṣa*, *mūrdhātarpaṇa*, *karṇatarpaṇa* and *akṣitarpaṇa*. The administration of *sneha* mixed with other substances, is known as *vicāraṇā* which is said to comprise sixtyfour equal kinds of permutations and combinations. However, the administration of unmixed *sneha*, known as *acchapeyasneha* is considered to be the best. It has the advantage of yielding optimum result in relatively small doses.[2]

Dose of sneha dravyas :

As regards the posology of *sneha*, Caraka and Vāgbhaṭa have described three doses viz., (*a*) *hrasva* (minimum), (*b*) *madhyama* (medium), (*c*) *uttama-pradhāna*, (optimum). The criteria for the determination of these doses are : (*a*) *hravsa*—a quantity which can be digested in 2 yāmas (6 hours), (*b*) *madhyama* in 4 yāmas (12 hours) and (*c*) *uttama* in 8 yāmas (24 hours).[3] Suśruta has described two additional doses viz., one digestable in one fourth of the day (3 hours) and the other, three fourth of the day (9 hours).

But the dose of *sneha* can be varied and administered, having regard to the *doṣic* states. The administration of smaller doses than those, under reference, is advisable, to test the subjects tolerance.[4] This method is followed by *Vaidyas* int he south (Kerala) and is currently practiced at the hospital attached to the Post-Graduate Training Centre in Āyurveda, Jamnagar.

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[1] ऋतौ साधारणे स्नेहः शस्तेऽह्नि विमले रवौ ।
तैलं त्वरायां शीतेऽपि धर्मेऽपि च घृतं निशि ।।
निश्येव पित्ते पवने संसर्गे पित्तवत्यपि ।
निश्यन्यथा वातकफाद्रोगाः स्युः पित्ततोदिवा ।।
(Aṣ. Hṛd : Sūtra *16* ; 12-14)

[2] युक्त्याऽवचारयेत् स्नेहं भक्ष्याद्यन्नेन बस्तिभिः ।
नस्याभ्यञ्जनगण्डूषमूर्ध्दकर्णाक्षितर्पणैः ।।
रसभेदैककत्वाभ्यां चतुःषष्टिविचारणाः ।
स्नेहस्यान्यभिभूतत्वादल्पत्वाच्च क्रमात्स्मृताः ।।
यथोक्तहेत्वभावाच्च नाच्छेपेयो विचारणा ।
स्नेहस्य कल्पः स श्रेष्ठः स्नेहकर्माशुसाधनात् ।।
(Aṣ. Hṛd : Sūtra *16* ; 14-17)

[3] अहोरात्रमहः कृत्स्नमर्ध्दाहं च प्रतीक्षते ।
प्रधाना मध्यमा ह्रस्वा स्नेहमात्रा जरां प्रति ।।
(Caraka : Sūtra : *13* ; 29-30)

[4] कल्पयेद्वीक्ष्य दोषादीन् प्रागेव तु ह्रसीयसीम् ।
(Aṣ. Hṛd. : Sūtra : *16* ; 18)

Śārṅgdhara Samhitā, a relatively more recent work, has equated the three *mātrās* or doses to definite quantities of *sneha* viz., *uttamas* I *pala*, (4 *karṣa*), *madhyama*-3 *karṣas* and *hrasva*-2 *karṣa*.[1] The observation made and the experience gained by the practical application of *sneha karma*, have shown that it is always safe to proceed first by testing the tolerance of the patient to *sneha*, with an initial small dose and then increase the same, paying regard to the individual's reaction.

It is seen that the posology of *snehas*, described above, on the basis of *Aṣṭāṅga-hṛdaya* is more or less the same as those described by Caraka, with this difference that, the latter has indicated the conditions in which each kind of dose may have to be administered. Suśruta is, on the other hand, is seen to have described five kinds of doses which include three of those described by Caraka and Vāgbhaṭa. He is also seen to have described specific conditions for which they are to be administered. These are presented in the table IV and V below :

Acchapeyasneha should be administered prior to the commencement of *samśodhana* therapy (vāmanādi)—the *mātrā* being *uttama*. A condition for the administration of *uttamamātrā*, in fact, for any *mātrā* of *sneha*, is that the patient should have completely digested the food taken during the previous 24 hours.[2] By implication, *sneha* should be administered on an empty stomach

Table IV

Three *Snehā* Mātrās with their Indications (after Caraka)[3a]

Pradhāna mātrā (Digestable in 24 hours)	*Madhyamamātrā* (Digestable in 12 hours)	*Hrasvamātrā* (Digestable in 6 hours)
1. *Prabhūtasnehanitya*	1. *Aruṣkapīḍita*	1. *Vṛdhda*
2. *Kṣutsahā*	2. *Sphotapīḍita*	2. *Bāla*
3. *Pipasāsahā*	3. *Pidkāpīḍita*	3. *Sukamāra*
4. *Uttamāgnibala*	4. *Kandūpāmāpīḍita*	4. *Sukhocita*
5. *Uttamabala*	5. *Kuṣthī*	5. *Riktakoṣṭhāhita*
6. *Gulmarogī*	6. *Pramehī*	6. *Mandāgni*
7. *Sarpadanṣta*	7. *Vātarakti*	7, *Jīrṇajvara*
8. *Visarpa*	8. *Nātibahvāśina*	8. *Jīrṇātisāra*
9. *Unmatta*	9. *Mṛdukoṣtha*	9. *Jīrṇakoṣtha*
10. *Mūtrakṛchhra*	*10.* *Madhyamabala*	10. *Avarabala*
11. *Gāḍhavarca*		

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[1] देया दीप्ताग्नये मात्रस्नेहस्य पलसंमिता ।
मध्यमाय त्रिकर्षा स्याज्जघन्याय द्विकर्षिको ॥
(*Ś*ārañgadhara : Vṛt : *1* ; 8)

[2] (१) पिबेत् संशमनं स्नेहमन्नकाले प्रकाङिक्षतः ।
शुद्ध्यर्थं पुनराहारे नैशे जीर्णे पिबेन्नरः ॥
(२) ह्यस्तने जीर्ण एवान्ने स्नेहोऽच्छशुद्धये बहुः ।
(Aṣ. Hṛd : Sūtra : *16* ; 19)

[3a] (i) Caraka : Sūtra : *13* ; 31-39

of a person in whom no food still remains to be digested after 24 hours.

Table V
Five *Snehamātrās* with their Indications
(after Suśruta[3b])

Doses	Time for Digestion	Indications
First Dose	3 hours	1. *Alpadoṣa*
Second Dose	6 hours	1. *Madhyadoṣa*
Third Dose	9 hours	1. *Bahudoṣa*
Fourth Dose	12 hours	1. *Glāni*
		2. *Mūrccha*
		3. *Mada*
Fifth Dose	24 hours	1. *Kuṣṭha*
		2. *Viṣa*
		3. *Unmāda*
		4. *Graha*
		5. *Apasmāra*

It can also be administered either before, during or after food. It is held that the administration of it before food is beneficial for diseases of lower parts of the body; during food, of the middle parts of the body and after food, of the upper portion as well as the other parts of the body[1].

The anupāna for the administration of sneha :

Hot water should be given as *anupāna* for the administration of *achshaasneha* except when either *tuvaraka* (Hydrocarpus-*wightiana*) or *bhilāvā* (Semicarpus *anacardium*) oil is being used. When there is doubt as to whether the *sneha* administered has been digested or not, the drinking of hot water is considered to be of great advantage.[2]

Preparatory regimen for sneha pāna :

Prior to the administration of *snehapāna*. the patient should be placed on a liquid diet *uṣṇa* in *vīrya* and *sparśa* (touch) and possessing *anviṣyandi* and *nātisnigdha*. It should be *asamkarma* (a non-combination of compatible and incompatible articles of food i.e. mixed foods)[3]. The patient should be advised to use only hot-water for all purposes.

The duration of snehapāna according to the nature of the koṣṭha :

The administration of *acchaghṛta* for three days would be necessary to a person with *mṛdukoṣtha* and seven days for one, whose *koṣṭha* is *krūra*[4], with the proviso that, the *snehapāna* is continued till the *koṣṭha* has attained the required degree of *snigdhatva*. The patient may develop *sātmya* for *sneha-dravyas* if they are used for long periods i.e. continued after seven days..[5]

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[35] (ii) Suśruta : Cikit : *31* ; 25-29

[1] प्राङमध्योत्तरभक्तोऽसावधोमध्योर्ध्वदेहजान् ।
(Aṣ. Hṛd : Sūtra : *16* ; 22)

[2] वायूष्णमच्छेऽनु पिबेत् स्नेहे तप्सुखपक्तये ।
आस्योपलेपशुद्धचैश्च तौवरारुष्करे न तु ।
जीर्णाजीर्णविशंकायां पुनरष्णोदकं पिबेत् ।
तेनोद्गारविशुद्धिः स्यात्ततश्च लघुता रुचिः ।।
(Aṣ. Hṛd : Sūtra : *16* ; 23-24)

[3] द्रवोष्णमनभिष्यन्दि भोज्यमन्नं प्रमाणतः ।
नातिस्निग्धमसंकीर्णं श्व स्नेहं पातुमिच्छता ।।
(Caraka : Sūtra : *13* ; 60)

[4] मृदुकोष्ठस्त्रिरात्रेण स्निह्यत्यच्छोपसेवया ।
स्निह्यति क्रूरकोष्ठस्तु सप्तरात्रेण मानवः ।।
(Caraka : Sūtra : *13* ; 65)

N.B.—Koṣṭha has been dealt with in the section on *virecana*.

[5] त्र्यहमच्छं मृदौ कोष्ठं क्रूरे सप्तदिनं पिबेत् ।
सम्यक्स्निग्धोऽथवा यावदतः सात्म्यीभवेत्परम् ।।
(Aṣ. Hṛd : Sūtra : *16* ; 29-30)

According to Suśruta, as commented upon by Ḍalhaṇa, *snehapāna* has to be proceeded with in the manner described below, having regard to the nature of the *koṣṭha*, of the *patient.*[1]

Nature of the *koṣṭha*	Duration of *snehapāna*
Mṛdu	*3 days*
Madhyama	*4, 5 & 6 days*
Krūra	*7 days*

Regimen during snehapāna :

The instructions which a person while taking *snehapāna* should strictly follow and simultaneously avoid others scrupulously, as could be gathered from the main classics of Āyurveda are furnished in the table VI.

Signs and symptoms of samyaksnigdha, asnidgha and atisnigdha snehapāna.

It is necessary to watch for the symptomatology of well administered *snehapāna*, known as *samyakṣnigdha lakṣaṇani*, as well as for *atisnigdha* (hyper) *lakṣaṇāni* or *asnigadha* (hypo) *lakṣaṇāni*. In the case of number one, further *sneha* should be stopped and the administration of the next stage of *pūrvakarma* i.e., *svedana karma*, may be proceeded with. In the case of *atisnigdha*, on the other hand, *snehapāna* has to be immediately stopped to avoid complications *snehavyāpt*, while, in *asnigdha*, a further course of *snehapāna* may have to be given. *Lakṣaṇas* of *samyak*, *asnigdha* and *atisnigdha* conditions as could be gathered from

Table VI

Regimen during *Sneha pāna*[2]

To be followed		To be avoided	
1. *Uṣṇodakopacāra*	(Ca., Aṣ., Su.)	1. *Vegadhāraṇa*	(Ca. Aṣ.)
2. *Brahmacarya*	,, ,,	2. *Vyāyāma*	,, ,,
3. *Rātriśayana*	,, ,,	3. *Uccavacana*	,, ,,
4. *Apravāta*	,, ,,	4. *Krodha*	,, ,,
		5. *Śoka*	,, ,,
		6. *Hima*	,, ,,
		7. *Ātapa*	,, ,,
		8. *Yānayātrā*	,, ,,
		9. *Pādayātrā*	,, ,,
		10. *Atyāsana*	,, ,,
		11. *Atisamsthiti*	,, ,,
		12. *Divāswapna*	,, ,,
		13. *Dhūma*	,, ,,
		14. *Raja*	,, ,,
		15. *Atinicopādhāna*	,, ,,
		16. *Atyuccopādhāna*	,, ,,

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[1] पिवेत् त्र्यहं चतुरहं पञ्चाहं षडहं तथा ।
सप्तरात्रात् परं स्नेहं सात्म्यीभवति सेवितः ॥
(Suśruta : Cikit : *31* ; 36)
तत्र त्र्यहं मृदुकोष्ठापेक्षया, मध्यकोष्ठापेक्षया तु चतुःपञ्चषडहानि, क्रूरकोष्ठापेक्षया तु सप्तरात्रम् ।
(Ḍalhaṇa on obove)

[2] (Caraka : Sūtra : *13* ; 62 : 64)
(Aṣ. Hṛd : Sūtra : *16* ; 26-28)

the main Āyurvedic classics are furnished in the table VII :

Snehavyāpat :

The symptomatology of faulty administration of *snehapāna* should also be borne in mind and prompt measures should be taken to counteract them. The complications, as may arise due to faulty administration of *snehapāna* are presented in the table VIII :

Table VII

Signs and Symptoms of Different Degree of *Snehapāna*[1]

Samyaksingdha lakṣaṇāni		*Asnigdha lakṣaṇāni*		*Atisnigdha lakṣaṇāni*	
1. *Dīptāgni*	(Ca.Su.Aṣ)	1. *Apraguṇavtāa*	(Ca.Su.)	1. *Mukhasrāva*	(Ca.Su.)
2. *Snehodvega*	,, ,, ,,	2. *Agnimārdava*	,, ,,	2. *Gudadāha*	(Ch.Su.)
3. *Asamhatavarca*	,, ,, ,,	3. *Rūkṣapurīṣatā*	,, ,,	3. *Pravāhikā*	,, ,,
4. *Aṅgalāghava*	(Ca. Su.)	4. *Grathitapurīṣatā*	,, ,,	4. *Pāṇḍutā*	(Ca. Aṣ.)
5. *Angamārdava*	,, ,,	5. *Rūkṣagātratā*	,, ,,	5. *Śarīragaurava*	(Ca.)
6. *Vātānuloma*	(Ca. Aṣ.)	6. *Kharagātratā*	(Ch.)	6. *Utkleśa*	,,
7. *Snigdhavarca*	,, ,,	7. *Durvarnatā*	(Su.)	7. *Aruci*	,,
8. *Snigdhāṅugata*	(Ca.)	8. *Daurbalya*	,,	8. *Tandrā*	,,
9. *Tvaksnigdhata*	(Su.)	9. *Urovidāha*	,,	9. *Indriyajādya*	,,
10. *Adhastātsneha-arsana*	,,			10. *Purīṣavipakvata*	,,
11. *Klāma*	(Aṣ.)			11. *Ghrāṇasrāva*	
				12. *Gudāsrāva*	

Table VIII

Snehavyāpat (Complication)[2]

1. *Tandrā*	(Ca,. Aṣ.)
2. *Utkleśa*	,, ,,
3. *Ānāha*	,, ,,
4. *Jvara*	,, ,,
5. *Kuṣṭha*	,, ,,
6. *Kaṇdu*	,, ,,
7. *Śopha*	,, ,,
8. *Arśa*	,, ,,
9. *Śūla*	,, ,,
10. *Sangñanāṣa*	,, ,,
11. *Stambha*	(Ca.)
12. *Pāṇdu*	(Ca.)
13. *Aruci*	,,
14. *Tṛshā*	,,
15. *Udararoga*	,,
16. *Stamitiya*	,,
17. *Grahaṇīdoṣa*	,,
18. *Vākyanigraha*	,,
19. *Āmadoṣa*	,,
20. *Jaḍatā*	(Aṣ.)
21. *Bhrama*	,,

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[1] Caraka : Sūtra : *13* ; 57 : 59
Suśruta : Cikit : *31* ; 51-54 &
Aṣ. Hṛd : Sūtra : *16* ; 30-31

[2] Caraka : Sūtra : *13* ; 75-76 &
Aṣ. Hṛd : Sūtra *16* : 32-33

Measures to correct the manifestation of faulty administration of *sneha* are as shown in the table IX below :—

Post-sneha and pre-pradhāna karma measures :

The subject to whom *snehapāna* was administered and signs and symptoms of optimum *sneha* (*samyaksnigdha lakṣaṇāni*) has been observed, should be placed on a diet consisting of a fluid preparation of *jāṅgala māmsa*, *uṣṇa*, both in *vīrya* and *sparṣa* or touch or, in the alternative, *kulathā* or *mudgayūṣa* and then proceed with the resort of the next step of *pūrvakarma* i.e. *svedana*[1].

2. SVEDANA

Swedakarma represents the therapy by which a person is made to sweat. As stated in the previous section, the patient should have achieved *samyaksneha lakṣaṇāni* before he is subjected to the *sveda* therapy.[2]

The objectives which *svedakarma* seeks to achieve can be summed up as follows :

> *snehakarma* previously administered, creates the *klinna* of *doṣas* (*malās*) whether they be in the *koṣtha* or in the *dhatūs* or are spread through the *srotāmsi* or in the extremities or in the bones, will be liquified by *sveda* therapy ; then, the *doṣas* (*malas*) can be brought to the *koṣtha* and eliminated by measures contemplated in *pradhānakarma* viz., *vāmanādi*[3]. Says Caraka "while *sneha* renders the body soft and disintegrates the accumulated *doṣas* (*malas*), *sveda*, melts the *doṣas* (*malas*) which have been held in the subtle channels of circulation the *srotāmsi*.[4]

Table IX

Cikitsā of Snehavyapata[5]

1.	*Ullekhana*	(Ca., (Aṣ.)	*12.*	*Rūkṣabheṣaja*	(Aṣ.)
2.	*Sveda*	„ „	*13.*	*Khala*	„
3.	*Takrāriṣṭa*	„ „	*14.*	*Uddala*	„
4.	*Rūkṣaṇa*	„ „	*15.*	*Yava*	„
5.	*Ruksapāna*	„ „	*16.*	*Śyāmaka*	„
6.	*Mūtrapāna*	„ „	*17.*	*Kodrava*	„
7.	*Triphalā sevana*	„ „	*18.*	*Pippalī*	„
8.	*Kālapratīkṣaṇa*	(Ca.)	*19.*	*Madhu*	„
9.	*Sramsaṇa*	„	*20.*	*Harada*	„
10.	*Kṣutnigraha*	(Aṣ)	*21.*	*Guggulu*	„
11.	*Tṛṣānigraha*	„			

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[1] स्निग्धद्रवोष्णधन्वोत्थरसभुक् स्वेदमाचरेत् ।
स्निग्धस्त्र्यहं स्थितः कुर्याद्विरेकं, वमनं पुनः ॥
(Aṣ. Hṛd : Sūtra : *36* ; 26)

[2] Refer foot note no. 3, page 99

[3] स्नेहक्लिन्नाः कोष्ठगा धातुगा वा
स्रोतोलीना ये च शाखास्थिसंस्थाः ।
दोषाः स्वेदैस्ते द्रवोकृत्य कोष्ठं
नीता सम्यक् शुद्धिभिर्निर्ह्रियन्ते ॥
(Aṣ. Hṛd : Sūtra : *17* ; 29 1/2)

[4] स्निग्धस्य सूक्ष्मेष्वयनेषु लीनं स्वेदस्तु दोषं नयति द्रवत्वम्
(Caraka : Siddhi : *1* ; 8)

[5] Caraka : Sūtra : *13* ; 73-78 &
Aṣ. Hṛd : Sūtra : *16* : 33-35

Qualities of Svedadravyas :

In Caraka's view, substances which are meant to be employed for *svedakarma* should possess the following qualities :—

uṣṇa, tīkṣṇa, sara, snigdha, rūkṣa, sūkṣma, drava, sthira and *guru*[1].

Place for the administration of sweda :

Sweda should be administered in a closed room not exposed to air, after satisfying oneself that the food that has been consumed earlier has been fully digested[2].

Indications and contra-indications of sveda karma :

The tabular statement below furnishes the indications and contra-indications for *swedakarma*. table X.

Table X

Svedana[3]

Indications		Contra-indications	
1. *Pratiśyāya*	(Ca. Aṣ.)	1. *Garbhiṇī*	(Ca. Su. Aṣ)
2. *Kāsa*	,, ,,	2. *Madhumehī*	,, ,, ,,
3. *Hikkā*	,, ,,	3. *Pittamehī*	,, ,, ,,
4. *Śvāsa*	,, ,,	4. *Tṛṣita*	,, ,, ,,
5. *Gaurava*	,, ,,	5. *Udararogī*	,, ,, ,,
6. *Svaraebhda*	,, ,,	6. *Durbala*	,, ,, ,,
7. *Koṣṭhanāha*	,, ,,	7. *Raktapitta*	(Ca., Su.)
8. *Vibandha*	,, ,,	8. *Atisāra*	,, ,,
9. *Śukrāghāta*	,, ,,	9. *Viṣapīḍita*	,, ,,
10. *Pārśvagraha*	,, ,,	10. *Madyavikāri*	,, ,,
11. *Priṣṭhagraha*	,, ,,	11. *Kasāyanitya*	(Ca. Aṣ)
12. *Katigraha*	,, ,,	12. *Madyanitya*	,, ,,
13. *Kukṣigraha*	,, ,,	13. *Pittarogī*	,, ,,
14. *Mūtrakṛchhra*	,, ,,	14. *Rūkṣa*	,, ,,
15. *Aṅgamarda*	,, ,,	15. *Vidaghabhaṣṭavradhna*	,, ,,
16. *Aṅdavṛddhi*	,, ,,	16. *Naṣṭasamjñah*	,, ,,
17. *Pādapīḍā*	,,	17. *Sthūla*	,, ,,
18. *Ūrupīḍā*	,, ,,	18. *Kṣudhita*	,, ,,

---

[1] उष्णं तीक्ष्णं सरं स्निग्धं रूक्षं सूक्ष्मं द्रवं स्थिरम् ।
द्रव्यं गुरु च यत्प्रायस्तद्धि स्वेदनमुच्यते ॥
(Caraka : Sūtra : *22* ; 15)

[2] निवातेऽन्तर्बहिः स्निग्धो जीर्णान्नः स्वेदमाचरेत् ।
(Aṣ. Hṛd : Sūtra : *17* ; 12)

[3] Caraka : Sūtra : *14* ; 16-24
Suśruta : Cikit : *32* : 25,
Aṣ. Hṛd : Sūtra : *17* ; 21-27

(*Table X Continued*)

Indications		Contra-indicatians	
19. *Jānupīḍā*	(Ca Aṣ)	19. *Kruddha*	(Ca Aṣ)
20. *Jaṅghāpīdā*	„ „	20. *Cintita*	„ „
21. *Pādagraha*	„ „	21. *Kāmala*	„ „
22. *Ūrugraha*	„ „	22. *Kṣata*	„ „
23. *Jānugraha*	„ „	23. *Adhyarogī*	„ „
24. *Jaṅghāgraha*	„ „	24. *Ativiśu*	„ „
25. *Khalli*	„ „	25. *Timirarogī*	„ „
26. *Āmadoṣa*	„ „	26. *Pāṇḍu*	(Su., (Aṣ)
27. *Vātakanṭaka*	„ „	27. *Śrānta*	(Ca.)
28. *Āyāma*	„ „	28. *Kṣiṇaujasa*	„
29. *Karṇaśūla*	(Ca.)	29. *Śoṣa*	(Su.)
30. *Manyāśūla*	„	30. *Ajīrṇa*	„
31. *Śirahśūla*	„	31. *Cardita*	„
32. *Galagraha*	„	32. *Stambhanīya*	(Aṣ)
33. *Ardita*	(Ca.)	33. *Visarpa*	„
34. *Ekāṅgaghāta*	„	34. *Kuṣṭha*	„
35. *Sarvāṅgaghāta*	„	35. *Kītavirecana*	„
36. *Vināmaka*	„	36. *Dugdhadadhimadhu snehapīta*	„
37. *Vijṛmbhaka*	„	37. *Bharamardita*	„
38. *Gṛdhrasī*	„	38. *Glāni*	„
39. *Śhotha*	„	39. *Puṣpita*	„
40. *Śīta*	„	40. *Sūta*	„
41. *Vepathu*	„		
42. *Samkoca*	„		
43. *Śūla*	„		
44. *Stambha*	„		
45. *Supti*	„		
46. *Vātavyādhi*	„		
47. *Kaphavyādhi*	(Aṣ.)		
48. *Arbuda*	„		
49. *Granthi*	„		
50. *Adhyavātā*	„		
51. *Hanugraha*			

Varieties of sveda karma :

Four kinds of *svedakarma* have been described viz., *tāpa upanāha, uṣṇadrava* and *drava.*[1] Suśruta has, however, furnished *doṣa* wise indications for the four kinds of *sveda* as below :[3]

Variety of Sveda	Doṣa
Tāpa	*Śleṣmā*
Uṣmā	*Śleṣmā*
Upanāha	*Vāta*
Drava	*Pitta-kapha*
	Pitta-vāta

1. *Tāpa sveda*

Tāpa sveda is the application of fomentation with warmed or heated cloth, iron ball, hand or any other material such as wheat bran, sand etc.[2] The principle involved here is the direct application of heat.

2. *Upanāha sveda*

Upanāhasveda (śālvaṇasveda) is comparable to the application of poultice. Drugs and materials employed for this purpose vary according to the *doṣas* involved.

A list of drugs and materials used for the purpose of upanāha sveda is furnished in the table XI and XII.[4]

Table XI

Drugs for Upanāhasveda (After Aṣṭāñgahṛdaya)

Vāta		*Sleṣmā-vāta*		*Pitta-vāta*	
1. Vachā	(Aṣ.)	1. Padmakāṣṭha	(Aṣ.)	1. Sursā	(Aṣ).
2. Kiṇva	,,	2. Prapaundarīka	,,	2. Phaṇiñjhaka	,,
3. Ṣatāhva	,,	3. Ṛddhi	,,	3. Kalamala	,,
4. Devadāru	,,	4. Vṛddhi	,,	4. Viḍañgā	,,
5. Sarvadhanya	,,	5. Vamśalocana	,,	5. Khārbusha	,,
6. Gandhadravya	,,	6. Karkataśṛñgi	,,	6. Mūṣīkaparṇī	,,
7. Rasna	,,	7. Amṛta	,,	7. Kaṭphalā	,
8. Eraṇḍa	,,	8. Jīwàṇujagaṇa	,,	8. Kāsāmbarda	,,
9. Salawanāmiṣa	,,			9. Kṣavaka	,,
10. Sneha	,,			10. Sarsī	,,
11. Cukra	,,			11. Bharngī	,,
12. Takra	,,			12. Kārmuka	,,
13. Paya	,,			13. Kàkāmāci	,,
				14. Kulāhala	,,
				15. Viṣamuṣṭi	,,
				16. Bhūtṛṇa	,,
				17. Bhūtakeśī	,,

---

[1] चतुर्विधः स्वेदः तद्यथा—तापस्वेद, ऊष्मस्वेद, उपनाहस्वेदो, द्रवस्वेद इति, अत्र सर्वस्वेदविकल्पावरोधः ।
(Suśruta : Cikit : *32* ; 3)

[2] Suśruta : : Cikit : *32* ; 14

[3] तापोऽग्नितप्तवसनफालहस्ततलादिभिः ।
(Aṣ. Hṛd. : Sūtra : *17* ; 1)

[4] Aṣ. Hṛd : Sūtra : *17* ; 24)

Table XII

Materials and Drugs for Upanāhasveda (After Suśruta[1])

1. *Eraṇḍamūla*
2. *Amla* (Kānjī)
3. *Lavaṇa*
4. *Sneha*
5. *Kakolādi*
6. *Alādi*
7. *Sursādi*
8. *Tila*
9. *Atasī*
10. *Sarṣapa*
11. *Kṛśara*
12. *Pāyasa*
13. *Utkārikā*
14. *Veshvara*
15. *Salvanadravya*

This method of *svedana* is obviously meant for the treatment of particular parts which are affected. Even so, *dravyās*, mentioned above can also be applied as pastes spread on well tanned leather and bound up on the affected part. In the place of leather, leaves possessing anti*vāta* properties like silk, woolen, or cotton clothes can be used. *Upanāha* applied thus, during the night should be removed early in the morning. Likewise, the *upanāha* applied in the morning should be removed in the night of the same day,[2] This method of treatment, in modern parlance, is antiphlogestic.

3. *Uṣmā sveda*

Uṣmāsveda *:* This variety of *sveda* comprehends *bāṣpasveda, piṇḍasveda* and *samstarasveda.*[3]

(*a*) *Baṣpa sveda* involves the use of water, *kāñjikam* or *kaṣāyas* in which is to be dropped a well heated (red hot) brick or stone and the exposure of the patient to the steam produced in the process.

(*b*) *Piṇḍa sveda :* In this variety of *sveda*, bundles of cowdung or *kalkas* of selected *auṣadhis*, are to be heated and used for fomentation to the affected part or the entire body, as the case may be. The use of either cooked *godhūma* (wheat) or, better still the variety of rice known as *navara* in Kerala, bundled in cloth and cooked again in a *pāyasam* made of milk and *bala* or *daśmūla kaṣāya*, is to be applied as fomentation all over the body. This method of treatment is known, popularly, as *navarakizi* in Malabar (Kerala). This will be discussed separately.

(*c*) *Samstara sveda* is to be administered in the manner described below :— *Eraṇḍapatra* or *yava dhānya*, together with *kañjikam* or substances which are *amla* or *sour* should be cooked in a closed earthen pot. This preparation should be spread on a thick cloth and covered with warm woollen rugs in a room which is not exposed so draught. The patient should be made to lie on this and covered with blankets.

The principle involved in this kind of sveda is the steaming the patient to perspire freely as in turkish bath.

4. *Drava sveda*

Dravasveda also proceeds on the same principle as above with a slight difference.

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[1] उपनाहस्वेदस्तु वातहरमूलकल्कैः……स्वेदयेत् । (Suśruta : Cikit. : *32* ; 12)

[2] बद्धं रात्रौ दिवा मुञ्चेन्मुञ्चेद्रत्रौ दिवाकृतम् । (Aṣ. Hṛd : Sūtra : *17* ; 5)

[3] Aruṇadatta on Aṣ. Hṛd : Sūtra : *17* ; 6)

It involves the preparation of kaṣāyas which are mentioned in the table No. XIII :

Table XIII

Drugs and Material for Drava sveda[1]

1.	Ṣigru	(Aṣ.)	15.	Surā	(Aṣ.)
2.	Varanaka	,,	16.	Ṣuktā	,,
3.	Eraṇḍa	,,	17.	Pāṇi	,,
4.	Kārañja	,,	18.	Dugdha	,,
5.	Sursā	,,	19.	Vātahara-dravya	(Su.) ,,
6.	Arjaka	,,			
7.	Śiriṣa	,,	20.	Dugdha	,,
8.	Vasā	,,	21.	Māmsa rasa	,,
9.	Vamśa	,,	22.	Yūṣā	,,
10.	Arka	,,	23.	Taila	,,
11.	Mālatī	,,	24.	Kāñjī	,,
12.	Śyonaka	,,	25.	Ghee	,,
13.	Vacādi	,,	26.	Vasā	,,
14.	Māmsa	,,	27.	Mūtra	,,

Collect the drugs and materials mentioned above in a big vessel and after applying a suitable *sneha* to the affected part of the patient, it should be covered with a cloth. Then fomentation is to be given to the patient, which should be bearably hot or, in the alternative, these *kaṣāyas* may be used as *pariṣeka*. This method is known as *pariṣeka sveda*. Patients suffering from *sarvāngavāta, arśas* etc., may be given *avagāhasveda*[2] i.e. the patient may be made to sit in a tube containing *kasāyas* mentioned above. This method has its parallel in the sitz bath[3].

The four kinds of *sveda,* described above are those mentioned by Suśruta and Vāgbhaṭa. Caraka, is on the other hand, seen to have described thirteen kinds of svedas viz., *saṅkara, prastara, nāḍī, pariśeka, avagāha, jentāka, aśmaghana, karṣū, kuṭi, bhū, kumbhikā, kūpa* and *holāka*[4]. It is further seen that Ḍalhaṇa has, in his commentary on Suśruta's description of four kinds of sveda, included the thirteen described by Caraka under the three. They are as in table no. XIV

Table XIV[5]

Thirteen Svedas of Caraka

Tāpa Sveda	*Uṣmā Sveda*	*Drava Sveda*
1. *Jentāka* (hot-house-sudation)	6. *Saṅkara* (mixed fomentation)	12. Pariṣeka (effusion-sudation)
2. Karṣū (trench sudation)	7. Prastara (hot-bed sudation)	13. Avagāha (bath sudation)
3. Kuṭi (cabin sudation)	8. Aśmaghana (stone bed sudation)	
4. Kūpa (pit sudation)	9. Nāḍī (steam kettle sudation)	
5. Holāka (under bed sudation)	10. Kumbhikā (pitcher bed sudation)	
	11. Bhū (ground bed sudation)	

---

[1] Aṣ. Hṛd : Sūtra : *17* ; 7-10
Suśruta : Cikit : *32* ; 13

[2] तैरेव वा द्रवैः पूर्णं कु डं सर्वांगगेऽनिले ।
अवगाह्यातुरस्तिष्ठेदर्शः कृच्छ्रादिरुक्षु च ॥
(Aṣ. Hṛd. : Sūtra : *17* ; 11)

[3] Sitz bath is that one given in a specially built tub so that only patients lower tack, hips and the upper thigh are immersed.

[4] Caraka : Satra : *14* : 39 : 40)

[5] Dalhaṇa on Suśhruta : Chiki : *32* ; 3)

Anagnisveda :

In addition to the foregoing *sveda-karmas* which are known as *āgneya sveda* (since the agency of *agni* is used in these measures), a variety known as *anāgneyasveda* wherein, the agency of *agni* is not employed. This kind of *sveda*, is generally indicated where *vātadoṣa* is enveloped by *medas* or *kapha.* Actual treatment with this *sveda* is carried out in the following manner :

Indugence in strenous physical i.e., manual labour, stay in a room which is closed to air, covering oneself with thick apparels, hunger, administration of different kinds of alcoholic beverages, causing sudden fright induction of rage or anger, the application of *upanāha* by covering the body with leather, wrestling and walking in the sun.[1]

Degrees of sveda to be administered :

Three degrees have been described viz., *avarā, madhyamā* and *vara.* A decision as to the degree of sweating as may have to be administered, depends on the nature of the disease, the patient, the habitat and season.[2]

Rūkṣa and Snigdha sveda :

Not withstanding the general principle mentioned above, the nature of *sveda* to be applied should take note of the *doṣas,* involved. The body of a patient suffering from *kapha* diseases should first be rendered *rūkṣa* (i.e. the avoidance of the application of *sneha* externally or internally) followed by *svedana*, employing substances possessing *rūkṣaguṇa.* Likewise, persons suffering from *kaphavāta* diseases may be prescribed *rūkṣa* and *snigdhasvedas* alternatively or mixed svedas may be administered.[3]

Of fundamental importance to *sveda* therapy is the mode of applying this measure when *vāta* is located in the *āmāśaya* and *kapha*, in the *pakvaśaya.* In the former case, the administration of *rūkṣasveda* should precede *snigdhasveda* and in the latter, the procedure referred to above has to be reversed.[4]

Parts to be avoided in Svedakarma :

Svedana of certain parts of the body such as vaṅkṣaṇas, should be resorted to, to a minimum extent. Likewise, the application of *sveda* to eyes, testes and pericardium should be extremely light. In the alternative, it is considered safe and prudent not to apply svedana to these parts.[5]

Signs and symptoms of samyaksvinna, asvinna and atısvinna :

During treatment with svedana, it is necessary to watch carefully for signs and symptoms of normal, hypo-and hyper-svedana, in the patient. The following table furnishes the signs and symptoms referred to table No. XV

---

[1] व्यायाम उष्णसदनं गुरुप्रावरणं क्षुधा ।
बहुपानं भयक्रोधावुपनाहाहवातपाः ॥
स्वेदयन्ति दशैतानि नरमाग्निगुणादृते ॥
(Caraka : Sūtra : *14* ; 64)

[2] (१) व्याधिव्याधितदेशर्तुवशान्मध्यवरावरम् ।
(Aṣ. Hṛd. : Sūtra : *17* ; 12)

(२) व्याधौ शीते शरीरे च महान् स्वेदो महाबले ।
दुर्बले दुर्बलः स्वेदो मध्यमे मध्यमो हितः ।
(Caraka : Sūtra : *14* ; 7)

[3] वातश्लेष्मणि वाते वा कफे वा स्वेद इष्यते ।
स्निग्धरूक्षस्तथा स्निग्धो रूक्षश्चाप्युपकल्पितः ॥
(ibid............... 8)

[4] आमाशयगते वाते कफे पक्वाशयाश्रिते ।
रूक्षपूर्वो हितः स्वेदः स्नेहपूर्वस्तथैव च ॥
(ibid...............9)

[5] अल्पं वंक्षणयोः स्वल्पं दृङमुष्कहृदये न वा ।
(Aṣ. Hṛd. : Sūtra : *17* ; 14)

Table XV[1]

Signs and Symptoms of Samyaksvinna, Asvinna and Atisvinna

	Samyaksvinna lakṣaṇāni			Asvinna lakṣaṇāni			Atisvinna lakṣaṇāni	
1.	Aṅgamārdava	(Ca. Su. Aṣ.)	1.	Sītānuparama	(Ca.)	1.	Pittaprakopa	(Ca. Su. Aṣ.)
2.	Şītavyuparama	(Ca., Aṣ.)	2.	Şūlānuparma	,,	2.	Mūrccha	,,
3.	Şūlavyuparama	,, ,,	3.	Stambhānigraha	,,	3.	Tṛṣā	,,
4.	Stambhanigraha	(Ca.)	4.	Gauravānigraha	,,	4.	Dāha	,,
5.	Gauravanigraha	,,	5.	Mārdavanutpāda	,,	5.	Raktaprakopa	(Su. Aṣ.)
6.	Agnidīpti	(Su.,)	6.	Svedabhāva	(Dal.)	6.	Atyarthasandhipīḍā	,,
7.	Tvakprasāda	,,	7.	Vyādhivṛddhi	,,	7.	Bhrama	,,
8.	Bhaktaśraddhā	,,	8.	Dehagaurava	,,	8.	Şarīrasadana	(Ca.)
9.	Srotonirmalatva	,,	9.	Uṣṇābhilāṣā	,,	9.	Svaradaurbalya	,,
10.	Tandrāhati	,,	10.	Dehakāṭhinya	,,	10.	Añgadaurbalya	,,
11.	Nidràhati	,,				11.	Sphototpatti	(Su.)
12.	Stabdhasandhiceṣṭā	,,				12.	Şyāvamaṇḍala darśana	(Aṣ.)
						13.	Raktamaṇḍala darśana	,,
						14.	Jvara	,,
						15.	Chardi	,,
						16.	Klāma	(Su.)

Post-sveda measures :

After the completion of the *sveda* therapy, the patient should be given gentle message followed by bath. He is to observe all the other regimen mentioned for *snehapāna.*

The sequelae of excessive svedanakarma and measures to counteract them are presented in the table no. XVI and XVII.

Table XVI[2]

Sequalae of Excessive Svedana

1.	*Pittaprakopa*	(Ca. Aṣ.)
2.	*Mūrccha*	,, ,,
3.	*Śarīrasādana*	,, ,,
4.	*Tṛṣā*	,, ,,
5.	*Svaradaurbalya*	,, ,,
6.	*Aṅgadaurbalya*	(Ca.)
7.	*Dāha*	,,
8.	*Raktakopa*	,,
9.	*Bhrama*	,,
10.	*Sandhipīḍā*	,,
11.	*Jvara*	,,
12.	*Chardi*	,,
13.	*Śyāvamaṇḍaladarśana*	,,
14.	*Rakta*	,,

Table XVII[2]

Management of Excessive Svedana

1.	*Madhura*	(Ca.)
2.	*Snigdha*	,,
3.	*Śīta*	,,
4.	All regimen of *Gṛṣmaṛtu*	
5.	*Stambhana*	(Aṣ)

PINDASVEDA

Pinḍasveda, among the different varieties of svedakarma, described above, has been as mentioned earlier in the introduction, developed as a fine art and applied with considerable benefit in Kerala, as prophylactic, restorative and curative purposes. It has extensive applicability deserving special mention in this connection. Its use in such diseases as *pakṣavadha, ardhāṅgavāta, sarvaṅgavāta, ardita., āmavāta, kroṣṭuka śirṣa* etc., deserve special mention in this connection.

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[1] Caraka : Sūtra : *14* ; 13-15

Suśruta : Cikit : *32* ; 23-24

Aṣ. Hṛd : Sūtra : *17* ; 15-17

[2] Caraka : Sūtra : *14* ; 15

Aṣ. Hṛd. : Sūtra : *17* ; 17

The method[1] of administering this treatment together with the mode of preparation of *kaṣāya* as well as *tailas* used for the purpose are as below :—

1. *Preparation of kaṣāya*

"Twelve *palams* of the root of *Bala* are taken, washed properly, cut into chips, crushed well and put into twelve *prasthas* of fresh pure water. This is now boiled till the water evaporates down to three *prasthas*. The decoction, thus obtained, has to be mixed with an equal quantity of cow's milk. The other half of the decoction may be kept for use at a later stage.

2. *Preparation of Pāyasam*

"To the first-half of the decoction mixed with milk, is added half a *prastha* of raw rice of the *navara* variety of paddy and cooked till it assumes the form of a semi-solid paste or pudding (*Pāyasa*). It is important that the *navara* rice should be perfectly free from husk and should be freshly prepared from unboiled (raw) paddy. It need not be washed before boiling with the mixture of the decoction and milk. It is better to have the rice used in the form of a coarse powder as that would hasten the cooking and blending process.

3. *Preparation of Piṇḍas*

"Now take eight pieces of new clean cloth, neither too thick nor too rough, but moderately smooth and tough enough to stand the strain of the processes that follow. Each piece should be a cubit square (about 18 inches square) and the edges should be well stitched and free from loose threads. The prepared pudding is divided into eight equal parts, each part being put into one of the pieces of cloth, the edges gathered and tied in the form of a ball after the manner of tying the mouth of sacs and leaving a tuft at the top of each bundle for holding it with case. Now the bundles are ready for use.

4. *Applications of Piṇḍa Sveda*

"Before applying the rice bolus bag to the body, the patient has to be properly prepared. To start with, he performs certain sacred rites, after which the medicated oil is applied to his head and body. The oils for the head and body differ according to the different types of diseases for which the measure is sought and should be according to the prescription of the physician.

"Without this preliminary application of oil to the head and body, *piṇḍa sveda* form of applying heat to the body by means of massage with the rice-bolus bags should not be practised; the body must be well anointed with the selected medicated oil before it is subjected to heat and diaphoresis if untoward incidents are to be avoided. The oil covering protects one from sudden evaporation of perspiration and its consequences such as pneumonia. To avoid the oil from the head trickling to the face and eyes, a piece of cloth may be tied round the head across and around the forehead and passing above the eyebrows. The patient is now made to sit in the special wooden platon basin. (Fig. I).

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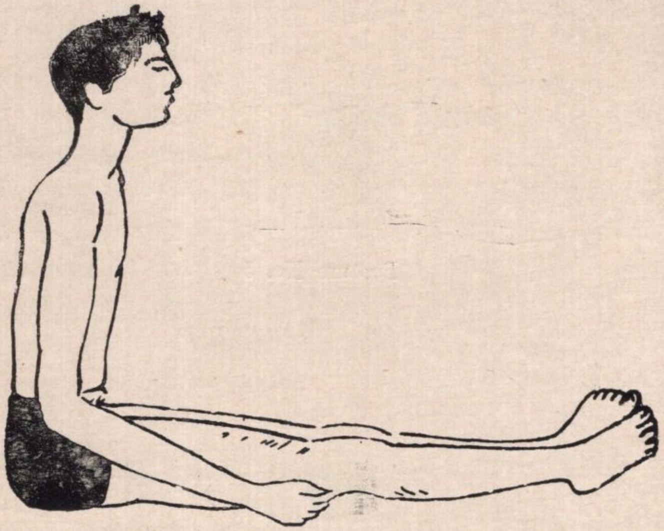
[1] (१) तिलमाषकुलत्थाम्लघृततैलामिषोदनैः ।
पायसैः कृसरैर्मांसैः पिण्डस्वेदं प्रयोजयेत् ॥
(Caraka : Sūtra : *14* ; 25)

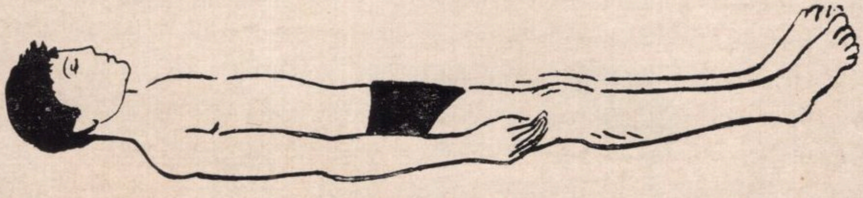
(२) गवादिशकृता द्रेण पिण्डीकृतेनोपनाहग्रन्थोकारि-
काकृसरमांसपिण्डैर्वा वातरोगेष्विति पिण्डस्वेदः ।
(Aṣ. Sam : Sūtra ; 26)

PLATE IV

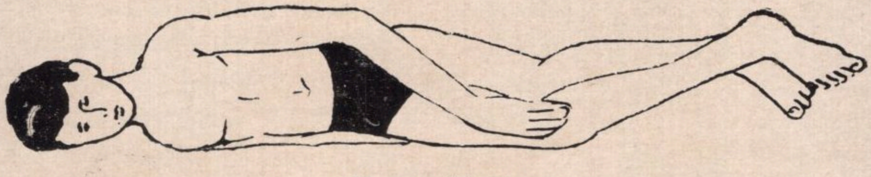
Fig. 7 Postures During Pindasveda



Posture No. 1



Posture No. 2



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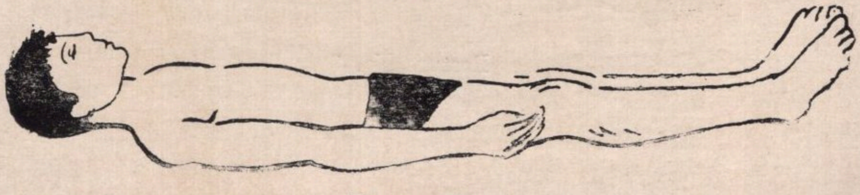
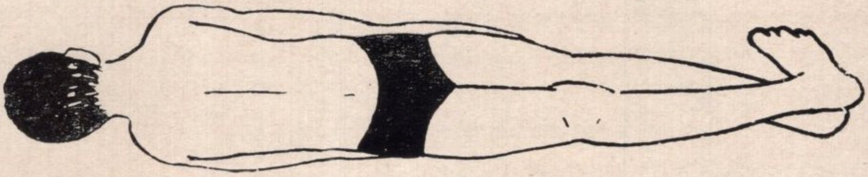


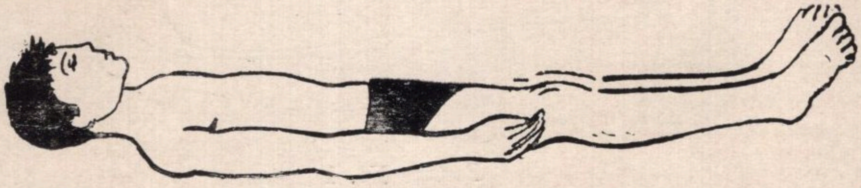
Posture No. 4

PLATE V

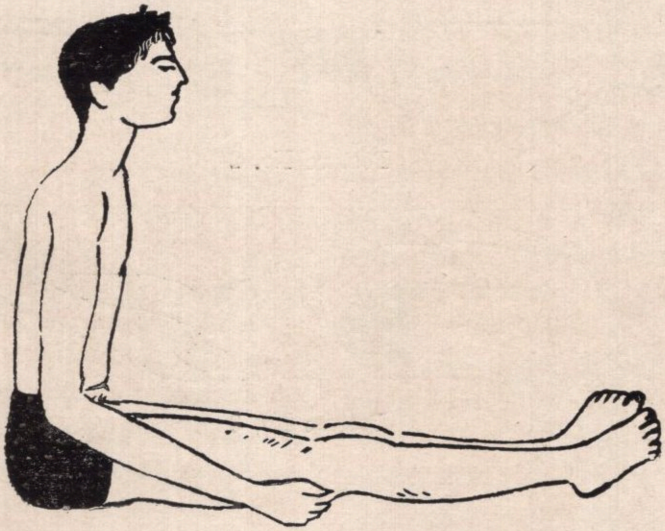
Fig. 7. (*Continued*)



Posture No. 5



Posture No. 6



Posture No. 7

"It may be recalled that only half of the decoction of *Bala* was used in the making of the pudding and the other half was reserved for future use. This reserved portion of the decoction is now taken up and mixed with an equal quantity of milk and placed on a low fire. This hot mixture of milk and decoction is meant to replenish heat and for the medication of the bolus bags throughout the procedure. Smoke or heat from the fire kept near for warming the milk and decoction should not be a source of irritation or disturbance to the patient or attendants. The room should be well ventilated and lighted taking care that the patient is not exposed to draughts dust or direct rays of the sun. To ensure this protection, the doors and windows, of the room may be partly or wholly screened with light thin fabrics.

"The actual process, in this measure, is one of gentle massaging of the whole body of the patient with the bolus bags. Four attendants are required to carry out this process. It is best to use hands experienced in this technique. The attendants should be quite and fully attentive to their duties, they should never cause any annoyance or irritation to the patient by their gossip or action. If the patient is a female, it is better to employ female attendants. If female attendants are unavailable, old and experienced males may be employed; when so employed, it is very essential that they should maintain the strictest decorum. The platen-basin is to be arranged in such a manner as to secure the maximum amount of privacy for the patient and freedom of movement for others. The patient is now seated in the basin. Four of the eight bolus bags are now taken and put into the hot mixture of milk and decoction kept over the fire and allowed to remain in it for a few minutes, say five to ten, to get them warmed. They are now taken out, each attendant taking one. The bolus bags are held in the right hand by its tuft and the bolus part felt by the palm of the left hand to test its heat. When the bolus has a warmth that could be comfortably borne by the patient, the body is massaged with it by the attendants. The direction of massage should always be downwards and begins from the neck area. Two attendants are posted to each side of the patient, one on each side massages the part between the neck and the hips while the other the lower limbs. Both sides should be massaged at the same time. Strictest care is to be taken to ensure uniformity of temperature and pressure on all parts of the body. While four bags are in use, the other four are kept in the mixture over the fire; when the four in use are cooling down they are returned to the mixture for the four that were there till then and the massage is maintained continously without any appreciable break, repeating the change as often as required.

"Massage is started with the patient sitting erect in the platen-basin ; after some time the patient is made to lie on his back, the massage being continued now in this position; after some time, he is made to lie on one side, again on his back, then on other side, once again, on his back and finally in the erect sitting position. Massage is done in these various positions viz., seven (Ref. figures 7 and 7b). Massage in each posture is maintained for about 15 minutes, the whole process taking about an hour and three

ers. The time for the treatment may
ıcreased or reduced according to the
al condition and health of the patient.
3y the time the massaging is over, the
ıre of the decoction and milk that was
ıe fire would also have been completely
ıp having been absorbed by the pudding
ransferred on to the body of the patient
g the process. When massaging is
ed all the bolus bags are opened out
the pudding remnants remaining there
aken and applied to the body of the
ıt and rubbed by the hands acting as
ıe massaging process. After doing so
bout five minutes, the pudding now
ng to the body of the patient is removed
raping with some suitable material such
e edge of the leaves of the cocoa-nut,
, the oil on the head is removed by
e wiping with a dry cloth. This rubbing
d not be hard to produce heat by friction
ıysical shaking of the body. The head
body thus cleaned are again to be anointed
with the prescribed medicated oils and bathed. The interval between the application of oil and the bath should not be more than five minutes. For bathing, water boiled and cooled down to a comfortable degree of warmth should be used for the head and not for the body.

"This treatment may be done continuously either da'ly or on alternative days for a period of seven or fourteen days as may be required according to the physical condition of the patient and nature of the disease. Generally, a course of this treatment may last for 7, 9, 11 or 14 days, and, at times, even upto 21 to 28.

"It world be advisable to alternate the positions of the massuers every other day, so as to eliminate defects due to differences in efficiency.

"Great restrictions are to be observed during the days of actual treatment as well as for an equal number of days, thereafter, in respect of diet as well as physical and mental exertions of every type."[1]

SECTION IV

PRADHĀNAKARMA

s stated earlier, the main or *pradhāna-*
as are *vamana*, *virecana*, *anuvāsana* and
ha bastis and *śirovirecana*. In this
s, the author has confined himself to the
y of *vamana* and *virecana karmas* which
been practically applied and studied
ıe wards of Post-Graduate Training Centre
yurveda, Jamanagar.

1. VAMANA KARMA

Caraka has defined *vamana* and *virecana*
ollows :—

Vamana is that which eliminates *doṣas* (*malās*) through the upper pathway and *virecana* as the elimination of *doṣas* (*malās*) through the lower pathway. The term *virecana* has also been defined by him as the removal of *doṣas* through both the channels.[2]

The place of *vamana* in the total scheme of the *pañcakarma* therapy is of fundamental importance. According to this scheme, *vamana* is not merely a matter of adminis-

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Moss—Āyurvedic Treatment of Kerala.
त्र दोषहरणमूर्ध्वभागं वमनसंज्ञकम्: अधोभागं विरेचन-संज्ञकम्: उभयं वा शरीरमलविरेचनाद्विरेचनसंज्ञा लभते ।
(Caraka : Kalpa : *1* ; 4)

tration of emetics to empty the contents of the chest, as in the treatment of bronchiectasis and, the stomach, of its contents, as in certain kinds of poisoning. According to the pañcakarma scheme it is a measure meant to be applied after the patient has been prepared properly with *sneha* and *svedakriyās* included under *pūrvakarmas*. Figuritively speaking, the patient is now metabolically fit and in a position to eliminate various kinds of endogenous toxic substances which have accumulated in his system. The administration of emetics is a well known and tried procedure recommended by Āyurveda in the treatment of fevers in certain stages. It is not in the latter sense that *vamana*, as an important ingredient of organised pañcakarma therapy, is meant.

The qualities of vamana dravyas :

According to Caraka, drugs that are uṣṇa, tīkṣṇa, Sūkṣma, *vyavāyī* and *vikāśī*, reaching the *hṛdaya* by virtue of their *vīrya* and circulating through *sthūla* (large) and *aṇu* (subtle) *srotāmsi* pervade the entire body. They liquify the *doṣasaṅghāta* (*sancita malās*) retained in the body, by virtue of their *viśyandiguṇa* and break them up by their *tīkṣṇaguṇa*. This *doṣasaṅghāta* (*sañcita malās*) being thus broken down, are kept floating in the body of a person who has undergone *snehanakarma* and remains detached very much like honey kept in a pot smeared with ghee and being drawn by its *anupravaṇaguṇa*, it flows towards the *āmāśaya* and being propelled upward by the *udānavāta*, the *doṣasaṅghāta* (*sañcita malas*) gets thrown upward as a result of the *agni* and *vāyuguṇas*, as well as by *ūrdhavabhāgaprabhāva* of the drugs. Owing to the *salila* (*ap*) and *prithiviguṇas* and *adhobhāgaprabhāva* of drugs, it purges downwards. Where both the guṇas, mentioned above, are combined, it eliminates through both ways.[1]

Indications and contra-indications of vamana therapy :

Doṣic conditions

(*a*) *Vamana* is the therapy of choice where *kapha* is impaired or in *samsarga doṣa* in which *kapha* is relatively the dominant factor in the combination. Likewise, where *pitta* is impaired or is a dominant factor in *samsarga*, *virecana* should be the tehrapy of choice.[2]

(*b*) As regards patients in whom *vamana* has special indication for and contra-indication against are presented in the table no. XVIII :—

Tbale XVIII[3]
Vamana Therapy

Indications		Contra-Indications	
1. Navajvara	(Ca. Su. Aṣ.)	1. Kṣata	Ca., Su. Aṣ.)
2. Kāsa	,, ,, ,,	2. Kṣīṇa	,, ,, ,,
3. Śvāsa	,, ,, ,,	3. Atiśūla	,, ,, ,,
4. Slīpada	,, ,, ,,	4. Kṛśa	,, ,, ,,
5. Prameha	,, ,,	5. Abala	,, ,, ,,
6. Adhogātaraktapitta	,, ,, ,,	6. Vṛddha	,, ,, ,,

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[1] Caraka : Kalpa : *1* ; 5

[2] Caraka : Siddhi : *2* ; 7-10 ; Suśruta : Cikit. : *33* ; 14-18 ; Aṣ. Hṛd. : Sūtra : *18* ; 1-6

[3] एकाहोपरतस्तद्वद् भुक्त्वा प्रर्छदनं पिवेत् । स्यात्त्वसंशोधनार्थाये वृत्तिः स्नेहे विरिक्तवत् ॥ (Caraka : Sūtra : *13* ; 81)

Table XVIII (Continued)
Vamana Therapy

Indications		Contra-Indications	
7. Hṛllāsa	(Ca. Su. Aṣ.)	7. Kṣudhita	(Ca. Su. Aṣ.)
8. Apacī	,, ,, ,,	8. Garbhiṇī	,, ,, ,,
9. Unmāda	,, ,, ,,	9. Duścardana	,, ,, ,,
10. Atisāra	,, ,, ,,	10. Ūrdhvaraktapitta	,, ,, ,,
11. Stanyadoṣa	,, ,, ,,	11. Prasaktachardi	,,
12. Pīnasa	(Ca. Su.)	12. Prasaktammūrdhāvāta	,, ,, ,,
13. Mandāgni	,, ,,	13. Āsthapita	,, ,, ,,
14. Ajīrṇānna	,, ,,	14. Āmavatāśita	,, ,, ,,
15. Viṣapīta	,, ,,	15. Udāvarta	,, ,, ,,
16. Praseka	,, ,,	16. Mūtraghāta	,, ,, ,,
17. Arocaka	,, ,,	17. Plīhā	,, ,, ,,
18. Apasmāra	,, ,,	18. Gulma	,, ,, ,,
19. Ṣoṣa	,, ,,	19. Udara	,, ,, ,,
20. Mukhapāka	,, ,,	20. Svaropaghāta	,, ,, ,,
21. Kaphavyādhi	,, ,,	21. Ṣrānta	(Ca., Su.,)
22. Kuṣṭha	(Su., Aṣ.)	22. Pipāsita	,, ,,
23. Rajayakṣmā	,, ,,	23. Adhyayanaparasakta	,, ,,
24. Visarpa	(Su., Aṣ.)	24. Samvṛtakaṣṭha	,, ,,
25. Galagraha	(Ca.)	25. Durbala	,, ,,
26. Galagaṇḍa	,,	26. Cintāprasakta	,, ,,
27. Viruddhānna	,,	27. Hṛdroga	,, ,,
28. Viṣūcikā	,,	28. Ashthila	,, ,,
29. Alaska	,,	29. Parshvaśūla	,, ,,
30. Garapīta	,,	30. Kṛmiroga	(Su., Aṣ.)
31. Dasṭa	(Ca.)	31. Ṣuddhavātaroga	(Su., Aṣ.)
32. Dagdha	,,	32. Rūkṣa	,, ,,
33. Viddha	,,	33. Upavāsaprasakta	(Ca.)
34. Avipāka	,,	34. Maithunaprasakta	,,
35. Paṇḍuroga	,,	35. Vyāyāmaprasakta	,,
36. Arbuda	(Su.)	36. Kṣāma	,,
37. Vidārikā	,,	37. Sukumāra	,,
38. Meda	,,	38. Siṛahśūla	,,
39. Cittavibhrama	,,	39. Ṣankhaśula	,,
40. Hṛdroga	,,	40. Karṇasūla	,,
41. Vidradhi	,,	41. Akṣiśūla	,,
42. Pūtināsā	,,	42. Arśa	(Aṣ.)
43. Kaṇṭhapāka	,,	43. Atyagni	,,
44. Oṣṭhapāka	,,	44. Bhrama	,,
45. Karṇasrāva	,,		
46. Adhojihvikā	,,		
47. Upajihvikā	,,		
48. Galāśuṇḍikā	,,		
49. Kaphasthāna janya vikāra	,,		
50. Granthi	(Aṣ.)		
51. Ūrdhva jatruroga	,,		

The methodology of administration :

It was already noted that the proper season for undertaking *saṃśodhana cikitsā* is *sādhāraṇakāla* viz., śrāvaṇa, kārtika and Caitra months and the patient should be previously prepared with *sneha* and *sveda pūrvakarmas*. The patient should go in, for *vamana* therapy, after a day's rest.[1]

After the completion of *sneha* and *svedakarma*, a day previous to *vamnna* therapy, the patient should be fed either with preparations of fish or *tila* which may stir up *kapha*. He is then encouraged to rest and sleep. On the morning of the day following *vamana* is to be administered, preferably, on an empty stomach or in the alternative, an hour after feeding the patient with a *paya* mixed with *ghee* so that his stomach may be lubricated. It is, of course, understood that, the food taken by the patient during the previous 24 hours has been completely digested.

This method is not applicable in the case of following type of patients., aged, children, weak, inpotent, cowardly etc. *Vamana* may be administered to the rest having regard to the stage of the disease and after the administration of alcohol, milk, sugarcane juice in abundant quantities. The administration of milk before *vamana* therapy, as mentioned above, is still practiced by Kerala *Vaidyas* and it has also been applied in the hospital attached to the Post-Graduate Training Centre in Āyurveda, Jamnagar.

Vamana may be administered with drugs suitably prepared, keeping in view the particular disease for which this therapy is meant. In other words, the administration of *vamana* and the dosage of drugs meant for it, are to be strictly individualised, having regard to the state of the patient's *kapha*. However, a common vehicle for *vamana* is honey and *saindhava* or rock salt.

The patient may be made to sit on a short stool, knee-high, and encouraged to keep his mind calm and traquil and administer the combination of *vamana-dravyās*, specially chosen for him. Vāgbhaṭa has suggested that the patient's mind should be inured to the medicaments administered, so much so, he should earnestly look forward to the time when vomiting may commence.

Caraka has stated that the patient should be observed for a *muhūrta* (48 minutes) after the administration of *vamanadravyās*. According to him, the onset of perspiration is indicative of the liquefication of *doṣas* (*malas*), *lomaharṣa* or horripilation signifies that the *doṣa* (*mala*) has been dislodged from places where it has been stagnant, the distension of the stomach as being caused by the *doṣa* which has reached this place. Hṛllāsa or nausea and *āsyasravaṇam* or salivation are indicative of its upward movement for being expelled.

The patient is then instructed to vomit without straining himself unduly and discouraged from inhibiting this urge. In the case of sluggish response, the patient's fauces should be tickled to encourage the emptying of the stomach. His head should be supported while he is actually vomiting.[2]

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[1] एकाहोपरतस्तद्वद्भुक्त्वा प्रच्छर्दनं पिबेत् । स्यात्त्वसंशोधनार्थीये वृत्तिः स्नेहे विरिक्तवत् ॥ (Caraka : Sūtra : *13* ; 81)

[2] Caraka : Sūtra : *15* ; 8-12, Aṣ. Hṛd. : Sūtra : *18* ; 12-20

The extent to which *vamana* should be allowed and the nature of drugs to be administered doṣawise are furnished in table no. XIX.

Table XIX

Vamana Dravyas Doṣawise[1]

Doṣas	*Types of Drugs to be used*		
	Rasa	Guṇa	Vīrya
1. *Kapha*	*Katu*	*Tīkṣṇa*	*Ūṣṇa*
2. *Pitta*	*Madhura*	×	*Śītala*
3. *Kaphavāta*	*Lavaṇa* & *Amla*	*Snigdha*	×

The limit uptill which *vamana* should be allowed to take place is either until the appearance of *pitta* in the vomitus or the elimination of the entire accumulated *kapha*.[2]

Caraka has directed that the vomitus should be collected in a spittoon and examined carefully to ascertain the degree of *vamana* achieved. This, in his view, is necessary to enable the administration of proper after treatment-*samsarjanakarma*.

DEGREE OF SAMŚODHANA BY VAMANA

Three degrees of śodhana by *vamana-karma* have been described viz., *pravara* (maximum), *madhya* (medium) and *jaghanya* (minimum). Those can be judged by two criteria viz. *vaigiki* (number of vegas)[3] and *māniki* quantity of *doṣa* or *mala* expelled). This is furnished in the table no. XX.

Table XX

Degrees of Śodhana by Vamana[4]

(After Vāgbhaṭa)

Degree of *śodhana*	Number of *vegas*	Weight of *doṣa* (*mala*) expelled
1. *Pravara* (maximum)	8	2 *Prastha*[5] (108 Tolas)
2. *Madhyama* (Medium)	6	1 *Prastha* (54 Tolas)
3. *Jaghanya* (low)	4	1/2 *prastha* (27 Tolas)

The table above, is after Vāgbhaṭa but Caraka has however, noted that the amount of doṣas expelled in *pravara*, *madhya* and *jaghanya vamana śodhana* is 1, $1\frac{1}{2}$ and 2 *prasthās* respectively.[6]

The quantity of the *doṣa* eliminated through *vamana* should not be more than 50% of that eliminated through *virecana*. The quantitative calculation, referred to above, excludes medicaments administered for *vamana* ; thus, *vegās* should be counted only after the drugs administered have been eliminated.[7]

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[1] Aṣ. Hṛd : Sūtra : *18* ; 21-22

[2] (१) क्रमात् कफः पित्तमथानिलश्च यस्यैति सम्यगवमितः स इष्टः ।
(Caraka : Siddhi : *1* ; 15)
(२) पित्तस्य दर्शनं यावच्छेदो वा श्लेष्मणो भवेत् ।
(Aṣ. Hṛd : Sutra : *18* ; 22)

[3] By *vega* is meant a single paroxysm of vomiting.

[4] Aṣ. Hṛd : Sūtra : *18* ; 31

[5] (1) *Prastha* in *Samśhodhana cikitsā* is 13$\frac{1}{2}$ *Pala* i.e. (54 tolas) and not the usual *prastha* of 16 *pala* i.e. 64 tola.
(२) वमने च विरेके च तथा शोणितमोक्षणे ।
सार्धंत्रयोदशपलं प्रस्थमाहुर्मनीषिणः ॥
(Cakrapāṇi on Caraka : Siddhi : *1* ; 14)

[6] ……विरेके प्रस्थस्तथा द्वित्रिचतुर्गुणश्च ।
(Caraka : Siddhi : *1* ; 14)

[7] ……विरेके वमने तु पीतम् ।
(Caraka : Siddhi : *1* ; 15)

Post-Vamana regimen :

In the case of *samyakyoga* of *vamana*, the patient should be cleansed and ordered to rest in a house protected from wind and then, any one of the *dhūmas* mentioned below may be administered :

snaihika, vairecanika and *upaśamanīya dhūmas* or fumigations should be administered. This should be followed by instruction to spend the day without inclining the mind to loud speech, excessive eating, night-vigil, day-sleep, eating of various kinds of unwholesome meals and the supression or the excitation of natural urges.

Then, in the evening of the same day or on the following morning, when the patient compalins of hungers he should be given a bath with tapid water and placed on a diet of *raktaśāli* (red rice) and liquid diet which should be prescribed on the lines of *samsarjana karma* which will be discussed separately under *pascātkarma*.[1]

Table XXI

Vamana Karma[2]

Samyakyogalakṣaṇāni	*Ayoga lakṣaṇāni*	*Atiyoga lakṣaṇāni*
1. *Hṛcchuddhi* (Ca. Su.)	1. Hṛdayaviśudhhi (Ca. As.)	1. Mūrcha (Ca. Su.)
2. *Dehalāghava* ,, ,,	2. Sphotaka (Ca. As.)	2. Anilakopa (Ca. Aṣ.)
3. *Kālevegapravṛtti* ,, ,,	3. Koṣṭha ,, ,,	3. Phenilopagamana ,, ,,
4. *Pārsvaśuddhi* (Ca.)	4. Kanḍu ,, ,,	4. Raktacandrikopāgamana ,, ,,
5. *Mūrdhaśuddhi* ,,	5. Vegavibandha ,, ,,	5. Tṛṭ (Ca.)
6. *Indriyaśuddhi* ,,	6. Vegeśat pravṛtti ,, ,,	6. Moha ,,
7. *Mārgaśuddhi* ,,	7. Auṣadha vibhramśa ,, ,,	7. Nidrāhāṇi ,,
8. *Anatimahativyathā* ,,	8. Srotaviśuddhi (Ca.)	8. Balahāṇi ,,
9. Kaphapittavātavisarga ,,	9. Gurugātratā ,,	9. Varṇahāni ,,
10. Vegasvayamāvasthāna ,,	10. Jvara ,,	10. Svarahāni ,,
11. Kaṇṭhaśuddhi (Su.)	11. Kaphapraseka ,,	11. Hṛtpīḍā (Su.)
12. *Kaphasamsarāvasthāna* ,,	12. Anyavikāra ,,	12. Kaṇṭhapīda ,,
		13. Pittātipravṛtti ,,
		14. Kaṇṭhaśoṣa (Aṣ.)
		15. Dāha
		16. Bhrama
		17. Tama
		18. Svaśonitanirgama
		19. Samatā

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[1] Caraka : Sūtra : *15* ; 14-16
Suśruta : Cikit : *33* ; 8-9

[2] Caraka : Siddhi : *1* ; 15-16
Aṣ. Hṛd : Sūtra *19* ; 23-25

The foregoing table relates to signs and symptoms of *samyak yoga*, *ayoga* and *atiyoga* of *vamana karma*, other than those mentioned earlier.

Vamanvyāpta (*complications*) with their treatments, will be described with those of *virecana*.

VIRECANA KARMA

Virecanakarma is the second of *pradhāna-karmas*. It is not purgation in the usual sense in which it is generally understood, for, according to the *pañcakarma—scheme*, *virecana* should be administered only after 3 days rest after the patient has been properly prepared with *sneha* and *sveda*.[1a]

As pointed out earlier, *vamanakarma* is meant to eliminate such *doṣas* (*malas*) as can be drawn into the stomach from the gastric circulation in patients previously prepared with *sneha* and *sveda :* Even so, *virecanakarma* aims at the elimination of such *doṣas* (*malas*) as may not be eliminated by *sveda* and *vamana*. For, the channels of elimination, in this case, are meant to clear certain kinds of substances as can not possibly be excreted through such channels as sweat glands, kidneys, stomach and lungs. These are obviously substances which can be eliminated only through the liver and *puriṣdharākalā* i.e., the mucosa of the large intestine. A mention was made earlier to the secretion of feaces in the large intestine. To this may now be added the finding that the faecal fat is largely endogenous which is seen to continue to appear in the faces, though all fatty material has been excluded from the diet. It is also seen to be chemically different from ordinary food fat and resembles closely the blood-lipids consisting as it does of mainly lecithin and coprosterol, the latter being derived from cholesteral.[1b]

Thus, the implications of *snehapāna* followed by *svedana* and the elimination of *doṣas* (*malas*) through *virecana* can be envisaged hypothetically as follows :—

Some of the *doṣas*, *malas* (or waste-products) which have a tendency to accumulate in the subtle channels i.e., *dhātuvahāsrotāmsi* or capillary channels which transport nutrition to the *sthāyī dhātūs* and clear the *malas* or waste-products elaborated by them due to *agnimāndya* at the level of dhātvagni, are likely to be either lipid in nature or lipid soluble. These substances should either be utilised by the body as a source of energy by oxidation or eliminated through fats or through normal channels of their elimination viz., for the most part, the large intestine.

The entire object of *sneha* and *svedakriyās* together with the special scheme of deiting which involves an extremely low carbohydrate and high protein (jāñgala māmsarasa) diet, *virecana*—measures, prescribed under pañcakarma scheme, should be expected to clear the *malas* through the intestinal route.

The indications for and contra-indications against *virecana karma* may be seen in the table no. XXII :

[1a] स्नेहात्प्रस्कन्दनं जन्तुस्त्रिरात्रोपरतः पिबेत् ।
स्नेहवद्द्रवमुष्णं च त्र्यहं भुक्त्वा रसौदनम् ॥
(Caraka : Sūtra : *13* ; 80)

[1b] Best and Taylor : Physiological basis Medical Practice P. 589.

Table XXII

Virechanakarma—Indications & Contra-Indications[1]

Indications			Contra-Indications		
1.	Kuṣṭha	(Ca., Su., Aṣ.)	1.	Adhoga raktapitta	(Ca., Su., Aṣ.)
2.	Jvara	,, ,, ,,	2.	Alpāgni	,, ,, ,,
3.	Prameha	,, ,, ,,	3.	Salyrdita	,, ,, ,,
4.	Urdhvaraktapitta	,, ,, ,,	4.	Atisnigdha	,, ,, ,,
5.	Udara	,, ,, ,,	5.	Madātyaya	(Ca., Su.)
6.	Arśa	,, ,, ,,	6.	Kṣata	,, ,,
7.	Plīhā	,, ,, ,,	7.	Kṣīṇa	,, ,,
8.	Gulma	,, ,, ,,	8.	Atisthūla	,, ,,
9.	Mūtraghāta	,, ,,	9.	Bala	,, ,,
10.	Kṛmikoṣṭha	,, ,, ,,	10.	Vṛddha	,, ,,
11.	Visarpa	,, ,, ,,	11.	Śrānta	,, ,,
12.	Vātarakta	,, ,, ,,	12.	Pipāsita	,, ,,
13.	Yonidoṣa	,, ,, ,,	13.	Garbhiṇī	,, ,,
14.	Garadoṣa	,, ,, ,,	14.	Kṣatagudā	Ca., (Aṣ.)
15.	Visphoṭa	,, ,, ,,	15.	Niruda	,, ,,
16.	Bhagandara	(Ca., Su.)	16.	Dāruṇakoṣṭha	,, ,,
17.	Arbuda	,, ,,	17.	Navajvar	(Su., Aṣ.)
18.	Granthi	,, ,,	18.	Subhagā	(Ca.)
19.	Viṣūcikā	,, ,,	19.	Muktanala	,,
20.	Alāsaka	,, ,,	20.	Vilañghita	,,
21.	Pāṇḍuroga	,, ,,	21.	Durbalendriya	,,
22.	Netradāha	,, ,,	22.	Kāmādivyagra	,,
23.	Hṛdroga	,, ,,	23.	Ajīrṇa	,,
24.	Netraroga	,, ,,	24.	Adhmāna	,,
25.	Nāsaroga	,, ,,	25.	Abhighāta	,,
26.	Mukharoga	,, ,,	26.	Atirūkṣa	,,
27.	Karṇaroga	,, ,,	27.	Kṛṣa	,,
28.	Gudapāka	,, ,,	28.	Durbala	,,
29.	Medhrapāka	,, ,,	29.	Kṣudhita	,,
30.	Apasmāra	,, ,,	30.	Karmāhata	,,
31.	Arocaka	,, ,,	31.	Bharahatwa	,,
32.	Śotha	,, ,,	32.	Adhvahata	,,
33.	Pittavikāra	,, ,,	33.	Upavâsaprasakta	,,
34.	Vyânga	(Ca. Aṣ.)	34.	Maithunaprasakta	,,
35.	Halīmaka	,, ,,	35.	Adhyayanaprasakta	,,
36.	Śvāsa	,, ,,	36.	Vyāyāmaprasakta	,,
37.	Kāsa	,, ,,	37.	Cintāprasakta	,,
38.	Kāmalā	,, ,,	38.	Kṣâma	,,
39.	Apaci	,, ,,	39.	Bhayopatapta	(Su.)
40.	Śukradoṣa	,, ,,	40.	Ajīrṇabhakta	,,

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[1] Caraka : Siddhi : *2* ; 11-13
Suśruta : Cikit : *39* ; 29-30-32
Aṣ. Hṛd : Sūtra : *18* ; 8-11

Table XXII (Continued)

Indications		Contra-Indications	
41. Chardi	,, ,,	41. Navapratiśyāya	,,
42. Vīdradhi		42. Navaprasūti	,,
43. Pakvāśayaroga		43. Snehādyanupaskṛta	,,
44. Vibandha		44. Atisāra	(Aṣ.)
45. Duṣṭavraṇa		45. Soṣa	,,
46. Kacha			
47. Abhiṣyanda			
48. Bradhna			
49. Galagaṇḍa			
50. Śiraśūla			
51. Pārashvaśūla	(Ca.)		
52. Udāvarta	,,		
53. Mīlikā	,,		
54. Aripāka	,,		
55. Anāha	,,		
56. Vṛddhi	(Su.)		
57. Śastrakṣata	,,		
58. Kṣāradagdha	,,		
59. Agnidagdha	,,		
60. Pittasthānajanyaroga	,,		
61. Unmāda	(Aṣ).		
62. Hṛllāsa	,,		
63. Stanyadoṣa	,,		
64. Urdhvajatruroga	,,		

Qualities and varieties of virecanadravyas :

The qualities possessed by *virecana dravyas* are nearly identical to those of *vamana dravyas* with this difference, as mentioned earlier, that *virecana dravyas* are predominantly *salila* and *pārthiva* in their (*pāncabhautic*) constitution and possess *adhobhāga prabhāva*.

Caraka has, in another context, described three types of *virecana dravyas* viz., *sukhavirecana*, *mṛdu virecana* and *tīkṣṇa virecana*.[1] Shārṅgdhara, a relatively much later authority, has mentioned four types of *virecanadravyas* viz., *anulomana*, *sramsana*, *bhedana* and *recana*.[2]

Nature of the koṣṭha and virecana :

Before proceeding to the actual administration of *virecana dravyas*, it is necessary to determine the nature of the *koṣṭha* viz., *mṛdu* or *krūra*. According to Vāgbhaṭa, *Mṛdukoṣṭha* is one in which *pittadoṣa* is predominant. Even the drinking of milk is sufficient to purge the patient with this kind of *koṣṭha*. *Krūrakoṣṭha*, on the other hand, is one in which the influence of *vāta* is dominant. The administration of even a large quantity of *trivṛt* (Impoemia *turpethum*) does not produce any visible effect. In view of the above, the quality of *virecana dravyas* as may have to be administered, in keeping with the *doṣic* predominance in the *koṣṭha* or diseases which are predominantly *vātic*, *paittik* or *sleṣmik* are furnished in table XXIII.[1]

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[1] त्रिवृत्सुखविरेचनानां, चतुरङ्गुलो मृदुविरेचनानां, स्नुक्पयस्तीक्ष्णविरेचनानाम् । (Caraka : Sūtra : *25* ; 40)

[2] Ṣārṅgadhara : Pu : *4* ; 4-7

Table XXIII

Virecana-Dravyas-Doṣa wise

Doṣa	*Virecana dravya*
Vāta	*Snigdha, uṣṇa, lavaṇa,*
Pitta	Kaṣāya and madhura
Kapha	*Kaṭu*

Keeping the foregoing in view, *virecana*, should be administered to a person in whom *vamana karma* has already been completed and to whom a further course of *sneha* and *sveda* have been given. It may be administered at a time other than the *kaphakāla*.[2a]

Dosage of virecana dravyas :

The administration of a small quantity of virecana dravyas is preferred to massive doses which latter may act like a double-edged weapon. It may either cause excessive *virecana* or may produce harmful results. Hence, the administration of small quantities, at frequent intervals, is considered to be the best, specially, as it may gradually clear *doṣas* which have accumulated in the *koṣṭha* and finally remove them altogether. The administration of small doses of *virecana dravyas* is spcially suitable in *durbala* (weak), *alpadoṣa* and in persons of unknown *koṣṭha*.[2b]

Measures to be adopted when there is unsatisfactory response to virecana dravyas :

The following are measures which are to be adopted where there is no response or insatisfactory response to *virecana* therapy. In the former case, copious quantity of hot water should be administered and, in addition, abdominal stupe may be given. In the case of the latter, the patient may be given a light diet and *virechana dravya* may again be administered on the following day. In case the *koṣṭha* has not attained the required degree of *snigdhatva*, the patient may have again to go through a course of *sneha* and *sveda* (*pūrvakarma*) and after about 10 days, suitable *virecanna dravyas* may be administered.[3]

Degree of śodhana by virecana :

Three degrees of *saṁśodhana* by *virecana-karma* has been described viz., *pravara* (maximum), *madhya* (moderate) and *jaghanya* (minimum). These can be judged by two methods viz., *vaigikī* (number of vegas) and *manikī* (quantity of *doṣas* expelled). Details in this regard, are furnished in the table no. XXIV :

Tvble XXIV

Degree of śodhana by Virecana[4]

Degree of *śodhana*	Number of *vegas*	Weight of *doṣas* expelled
1. *Pravara* (maximum)	10	4 *prastha* (216 tolas)
2. *Madhyama* (moderate)	20	2 *Prastha* (108 tolas)
3. *Jaghanya* (minimum)	30	1 *Prastha* (54 tolas)

The degrees of *śodhana*, mentioned above, are after Vāgbhaṭa. Caraka has, however, described the weight of *doses* expelled in the three degrees of *śodhana* by *virecana*, referred to above, as 4, 3 and 3 *prasthaas* respectively. The calculation of *vegas* or weight, mentioned above, should not include the two or three early stools.[1]

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[1] Aṣ. Hṛd : Sūtra : *18* ; 33-34

[2] (*a*) Aṣ. Hṛd : Sūtra : *18* ; 33
(*b*) Aṣ. Hṛd : Sūtra : *18* ; 49-51

[3] Aṣ. Hṛd : Sūtra : *18* ; 35-37

[4] Aṣ. Hṛd : Sūtra : *18* ; 31

The limit uptill which *virecana* should be allowed to take place is the appearance of *kapha* in the purged material.[2]

The signs and symptoms of *samyakyoga*, *ayoga* and *atiyoga* of *virecanakarma* are furnished in the table no. XXV:

Post-*virecana* measures are similar to those of post-*vamana* regimen, with this difference that, in the former, administration of *dhūma*, is excluded.

The *vamana* and *virecana* *vyāpats* and their management are presented in the table no XXVI.

Table No. XXV

Degrees of Virecanakarma Symptomatology[3]

Samyakyoga-lakṣāṇāni		*Ayoga lakṣaṇāni*		*Atiyoga lakṣaṇāni*	
1. *Srotoviśuddhi*	(Ca.)	1. *Hṛdayaśuddhi*	(Ca.)	1. *Kaphakṣayajavikāra*	(Ca.
2. *Indriyasamprasāda*	,,	2. *Arocaka*	,,	2. *Raktakṣayajavikāra*	,,
3. *Laghutā*	,,	3. *Sleshmāprakopa*	,,	3. *Pittakṣayajavikāra*	,,
4. *Agnidīpti*	,,	4. *Pittaprakopa*	,,	4. *Anilotthavikāra*	,,
5. *Kramenavit*	,,	5. *Agnisāda*	,,	5. *Supti*	,,
6. *Anāmayatā*	,,	6. *Gurugatratā*		6. *Aṅgamarda*	,,
7. *Kramenavātamūtra*	(Su.)	7. *Kukṣyaśuddhi*	(S.A.)	7. *Klāma*	,,
8. *hṛccuddhi*	(Aṣ)	8. *Paridāha*	,,	8. *Vepana*	,,
9 *Kukṣiśuddhi*	,,	9. *Kandu*		9. *Nidrā*	,,
		10. *Vātaprakopa*	(Ca.)	10. *Balābhāva*	,,
		11. *Sveda*	,,	11. *Tamapraveśa*	,,
		12. *Pratiśyāya*	,,	12. *Unmāda*	,,
		13. *Tandrā*		13. *Hikkā*	,,
		14. *Chardi*	,,	14. *Mūrcchā*	,,
		15. *Vātānulomatā*		15. *Gudabhraṁśa*	,,
		16. *Mūtrasaṅga*	(Su.)	16. *Śūlodagama*	,,
		17. *Pīnasa*	(Aç)	17. *Kaphātiyoga*	,,
		18. *Vātasamga*	,,	18. *Gudānisaraṇa*	(Aṣ.)
		19. *Piḍikā*		19. *Bhrama*	,,
		20. *Ślehṣmotkleśa*		20. *Netrapraveśa*	,,
		21. *Pittotkleśo*		21. *Ativamanāmaya*	,,
				22. *Nihśleṣmāpitta*	

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[1] Caraka : Siddhi : *1* ; 13-14

[2] द्वित्रान् सविटकानपनीय वेगान्मेयं विरेके ।
(Caraka : Siddhi : *1* ; 15)

[3] Caraka : Siddhi : *1* ; 17-19
Suśruta : Cikit : *33* ; 24-27
Aṣ. Hṛd : Sūtra : *18* ; 38-41

Table XXVI

Vamana-Virecana Vyāpta[1]

Vyapta		Management
1. *Ādhmāna*	(Ca. Su.)	*Abhayaṅga, sveda, basti, anuvāsana, nirūha.*
2. *Parikartikā*	,, ,,	*Laṅghana, pācana, rukśoṣnalaguubhojana, madhura.*
3. *Parisrāva*	,, ,,	*Śamana, vamana, snehana, virecana, cūrṇa, asavāriṣṭa.*
4. *Hṛdgraha*	,, ,,	*Vamana, madhuraktudravya, pācana, svedana, anuvāṣana śirovirecana.*
5. *Aṅgamarda*	,, ,,	*Sneha, Sveda, vātahara karma.*
6. *Jihvāvraṇa*	,, ,,	*Pittāharakarma, raktapāna, raktabasti, syāmādileasti.*
7. *Gudabrhramśa*	(Ca.)	*Kṣayastambha, praveśa.*
8. *Stambha*		*Laṅghana, pācana, tīkṣaṇabasti, tīkṣhnavirecana.*
9. *Upadrava*	,,	*Sneha, sveda, vātaharakriyā.*
10. *Klama*	,,	*Langhana, pācana, snigdhatīkṣnasamśodhana.*
11. *Vamanasyādhogati*	(Su.)	*Snehana, tīksṇavamana.*
12. *Virecanasyordhvagati*		*Vamana, virecana*
13. *Savasthesauṣadha*	,,	*Uṣṇa jala. vamana.*
14. *Jīrṇauṣadha*	,,	*Tīkṣnauṣadhi.*
15. *Hīnadoṣapahṛta*	,,	*Sneha, sveda, virecana.*
16. *Vātaśūla*	,,	*Sneha, sveda, madhuyathititailānuvasana.*
17. *Ayoga*	,,	*Snehana, sveda, vamana, virecana.*
18. *Atiyoga*	,,	*Manthāpana, lakṣaṇacikitsā.*
19. *Pravāhikā*	,,	*Snehana, samṣodhana, āsthāpanabasti.*
20. *Vibandha*	,,	*Virecana. āsthāpana, anuvāsana.*

Drugs used for vamana and virecana :

The table below no. XXVII furnishes various preparations of *vamana* and *virecana dravyas* (6 each) which are in common use :—

Table XXVII

Preparations of vamana-virecana Drayas[2]

Dravyas	Number of preparation
1. *Madamaphala*	133
2. *Jimūtaka*	39
3. *Ikṣvāku*	45
4. *Dhāmargava*	60
5. *Kuṭajā*	18
6. *Kṛtavedhana*	60
7. *Syāmatrivṛit*	110
8. *Caturaṅgula*	12
9. *Lodhra* (Tilvaka)	16
10. *Mahāvṛkṣa*	20
11. *Saptalā*	39
12. *Dantī-dravantī*	48
	600

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[1] Caraka : Siddhi : *6* ; 21-30, Suśruta : Cikit : *34* ; 3-21

[2] Caraka : Sutra : *4* ; 5

SECTION V

PAŚCĀT KARMA

Paścāt karma literally means after treatment. It refers, in the present context, to the care and treatment viz., dietetic and medicinal, as may have to be administered to a patient who has successfully completed his *pūrva* and *pradhānakarmas*. *Paścāt karma* is as important as *pūrva* and *pradhānakarmas*. For, after the removal of *doṣas* (*malas*) from the body and the cleansing of the pathways, it is important to gradually restore *agnibalam* by properly planned diets. It has been said that just as a spark of fire can be gradually fed with straw and cow-dung develop into a big and constant flame even so, the *jāṭharāgni*, in a person who is subjected to *samśodhana* therapy may grow and become constant, capable of digesting all diets by being fed gradually with *peya* and the rest.[1]

The significance of the above can be appreciated better by taking into consideration the fact that, after the body has been cleansed of the *sancita malas* and *srotorodha* having been removed by *samśodhna* measures, the *agni* present in the *dhātus* may still remain to be ignited. In this state, the *agni* can be compared to a tiny spark which has to be gently fanned and fed with small quantities of *indhana* or fuel so that it may become a strong and steady flame, very much like the feeding of a small spark of fire with small quantities of straw and such other combustible materials, growing into a strong flame. If, on the other hand, a huge mass of wood is given to this tiny spark, the spark may be altogether extinguished. The same is true of *jaṭhara* and *dhātvagnis* after the *samśodhana* treatment. *Antarāgni*, in this state, has to be ignited by feeding it with small quantities of easely combustible *āhāra dravyas* which may be gradually increased as the *agni* also slowly picks up and becomes keen.

Hence, all the three authors of the main *samhitā granthas* have laid emphasis on the need to commence *paścātkarma* by dieting the patient with very light, *albeit*, nutritious food, and for this purpose, they have laid down the *samsarjana karma* which is as follows

> Says Caraka "A subject who has been put through *samśodhana* measures should be placed on *peya* (gruel), *vilepī* (thick gruel), *akṛtum* (unspiced) and *kṛtum* (spiced), *yūṣa* (soup) and *māmsa-rasa* (meat juice) in the order described here. He should take each one of these at three or two or one meal time, according, as the degree of *samśodhana* measures administered viz., *pradhāna* (maximum), *madhya* (medium) and *avara* (minimum).[2]

The following is the diet scheme for a person who has been put through *pradhāna* degree of *śodhana* in Table No. XXVIII:

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[1] यथाऽणुरग्निस्तृणगोमयाद्यैः संधुक्ष्यमाणो भवति क्रमेण ।
महान् स्थिरः सर्वपचस्तथैव शुद्धस्य पेयादिभिरन्तरग्निः ॥
(Caraka : Siddhi : *1*; 12)

[2] पेयां विलेपीमकृतं कृतं च यूषं रसं त्रिर्द्विरथैकशश्च ।
क्रमेण सेवेत विशुद्धकायः प्रधानमध्यावरशुद्धिशुद्धः ॥
(Caraka : Siddhi : *1*; 11)

Table XXVIII

Samsarjanakrama[1]

Meal Time		Type of Diet
First	meal	*Maṇḍa* of raktaśali (rice)
Second	,,	,, ,, ,,
Third	,,	,, ,, ,,
Fourth	,,	*Vilepī* ,, ,,
Fifth	,,	Hot water ,, ,,
Sixth	,,	,, ,, ,,
Seventh	,,	*Odana mudgayūṣa* with little salt and ghee
Eighth	,,	,, ,,
Ninth	,,	,, ,,
Tenth	,,	,, ,,
Eleventh	,,	Liquid *māmsa rasa* of *jāṅgala* group of animals, hot water and *Odana*
Twelfth	,,	,, ,,

SECTION VI

DISCUSSION OBSERVATIONS AND CONCLUSIONS

The author has attempted, in this thesis, to present the cognate principles—*prākṛta* (physiological) and *vaikṛta* (pathological) of Āyurveda which are basic to *pañcakarma* therapy as well as to make broad survey, as it were, of therapeutic measures such as *snehana, svedana, vamana, virecana* and *samsarjana krama,* which constitute this tehrapy. The cognate Āyurvedic principles referred to above, are the *doṣa-dhatū mala siddhānta* and the concept of *vaikṛta* (pathological) which are based on this *siddhānta.* He has been inspired to make this approach to the *pañcakarma* therapy, which is the back bone of classical *Āyurvedic* treatment, by an observation of Cakrapāṇi Datta that, *prakriti-jñāna* should precede the study of *vikṛti-vijnāna.*[2] In the ultimate analysis, the object of *kāyacikitsā* is to restore *doṣa-dhātu-mala sāmyata* with the one or the other, if not all the measures, included under the *pañcakarma* therapy. Hence, this approach to the subject.

In the chapter dealing with theories cognate to the *pañcakarma* therapy, a careful study of the *vāta* system, its composition and functions were examined in the light of some of the more recent modern contributions in allied fields of physiology, including biochemistry. This study has shown that, generally, in the *vāta* system, we have a parallel to the nervous system in all its different aspects, described by modern biological sciences. A striking resemblance between the *vāta* system and its modern compeer, the nervous system, specially, in the context of *sneha* and *basti*, relates to the *snigdhādi guṇas* of the constituents that compose the *vātavahāṣirā* or *snāyu*[1] as the case may be, through which *sārīravāta* manifests and operates. The nervous system is also seen to be composed, nearly almost, with lipids which are *sneha* in nature. The fat-linked proteins or lip-proteins, as they are called and nucleo-proteins exhibit, in addition, picchilatwa, *slakṣhnatva, mṛidutva, gurutva, madhuratva* etc.

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[1] Caraka : Sūtra : *15* ; 16

[2] ……प्रकृति ज्ञानान्तरत्वाद्विकृतिज्ञानस्य प्रथमं……।
(Cakrapāṇi on Caraka Cikit : *15* ; 3, 9)

The author sees in this feature, a fact of considerable practical significance. The *kṣaya* of these qualities are known to produce *prakopa* of *vāta* and, in the reverse direction, a *vṛddhi* of these qualities result, either in the restoration of the normal functions of *vāyu* or its *kṣaya* according to the degree of *vṛddhi*. In other words, the state of *vātavahā Śirā* or *snayu*, may decide the *prakopa, sama* or *kṣaya* states of *vāta* as could be judged from the symptoms manifested in each such state. This idea has been illustrated with experiemental data drawn from modern contributions in biochemistry and physiology relating to the nerve tissue, according to which, increased nervous activity results in the depletion of Nissel bodies which consist of a nucleo-protein containing iron. These bodies are considered to be a source of energy for the functional activity of nerve cells and they disintegrate in fatigue or due to certain poisons or after the section of neurone by a process of disintegration of this body, known as chromatolysis. Nueleo-proteins which are nucleic acids bounds to proteins have been shown to be extremely slimy and sweetish, the latter largely due to the presence of ribonucleic acid, which is a sugar. Even so, a deficit of the lipids of the nerve, specially the myelin a *sneha dravyas* is associated with hyper-activity. Thus, a point of fundamental importance has been made out in this thesis, that *guṇas* such as *rūkṣādi*, ascribed to *śārīravāta* which, according to highest authorities in Āyurveda, viz., Caraka and Suśruta is *asamghata* (incorporeal, imponderable, intangible), *anavasthita* (unstable), *avyakta* (inperceptible, unknowable), *vyaktakarma* (knowable only from the functions it performs), relate to the functional and physio-chemical states of the *vātavahā śira* or *snāyu*.

The practical implications of this conclusion has been tested and verified by the method of *sneha* therapy which supplies the deficit and restors the physio-chemical and functional states of the *vātavahā śira* or *snāyu*.

Another interesting and; possibly. far-reaching conclusion that has emerged from this study relates to the permeability of *snehadravyas* into the innermost recesses of the body. It is fully recognised to-day that the *kalās* that surround *dhātus* and *srotāmsi*, which are both *ayana* and *mukhas*, relate to the semi-permeability of the *srotāmsi*.. Semi-permeability is the property of being permeable to some substances and impermeable to others. By implication, the plasma cell membrane of the elements of various *dhātūs*, the *kalas* and *srotāmsi*, exercise a selective action or discrimination in the matter of allowing certain materials to pass through while rejecting others.

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[1] (१) स्नायु वायुवाहिनाड्याम् । (२) मेदसः स्नेहमादाय शिरास्नायुत्वमाप्नुयात् ।
(Vaidyaka Śabda Sindhu)

The author was again inspired by the observation made by Cakrapāṇidatta in his commentary on *srotovimāna* of Caraka *samhitā* that, *poṣaka dravyas* meant for a particular *dhātū* are not be allowed to permeate and nourish other *dhātūs* by their specific *srotāmsi*.[1]

According to modern views, the Starling's pore-diffusion hypothesis to which a reference was made earlier is generally inadequate to offer a satisfactory explanation of the behaviour of living membrane, described as, 'selective action.' This 'selective action', is, at present, poorly understood. It has been shown that two particles may be of equal size, yet, one can pass a given plasma membrane while the other can not. Again, a particle may be able to pass freely in one direction but not in the other. Energy expenditure is involved in the transmission of materials through living membranes. The migration of water and of glucose through plasma films, formerly regarded as classical examples of penetration by diffusion, is now known to be accompanied by complex chemical processes at the colloid surface. Thus, rather than visualizing a passive membrane with small holes we are led to consider plasma films as dynamic structure in which entering or leaving particles are actively handed across, from one side to other. Fatty components of membranes are thought to contribute particularly to these processes.[2]

Thus, *sneha dravyas* are fats in their many affections, viz. fatty acids, esters, sterols, acetone, etc. are capable of not only permeating the fatty components of the thin colloidal films that constitute the cell membrane but also serve two important purposes viz., (i) act as solvents and (ii) as fuel (*indhana*) which can be immediately burnt.

This has particular reference to *vātavahāśirās snāyūs* which can, in the opinion of the author, be reached only through the medium of *sneha* and no other. This view will explain the encouraging results observed by the administration of *śata* or *sahasrāvarta kṣīrabala ghṛtta* or *taila* by Kerala *Vaidyas*, in what would appear to be hopeless cases of *vātavyādhi*, such as *pakṣabādha, sarvāṅgavāta* etc.

Two cases of young boys suffering from *pakṣabādha* (hemiplegia with doubtful history of poliomyelitis) who were treated with *samśodhana* measures, followed by intense *sneha* therapy thereafter, recovered to such an extent as to be able lift weights, move their hands without support and walk with better control over and co-ordination of the affected limbs. Vide case nos. 7 and 8 Likewise, confirmed and chronic cases of *tamakaśvasa* and *jīrṇa kāsa* (bronchiectasis) yielded extremely encouraging results. The former cases were seen to get over their hypersensitive state under *sneha, sveda* and *vamana* therapy and were free from frequent attacks, at short intervals which they had 2 years prior to this therapy. The latter cases, which were of long duration, were also given *samśodhana* therapy. They were seen to obtain considerable relief from paroxymal cough and the expectoration of mucopurulent sputum was reduced to the minimum.

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[1] न चान्यस्रोतसा चान्यधातुपुष्टिः सम्भवति, सर्वपोष्याणां भिन्न-देशत्वात् । न ह्यभिन्नेन स्रोतसा भिन्नदेशवृक्षयोः सेचनमस्ति । (Cakrapāṇi on Caraka : Vimāna : 5 ; 3)

[2] Weisz : Biology : P. 46, MC Graw Hill Publication, (New York) 1954.

In a chronic case of *pāmā, snehana, svedana vamana* and *virecana karmas* without any external application was administered. The *pāmā* state cleared up dramatically. In the followup maintained for several months, the patient was seen to be free from recurring attacks.

The foregoing represent the more important type of cases studied, though in fact, *sneha* and *sveda*, as *samśamana karma* were administered in a large numbr of cases, in which there were no indication for *samśodhana* therapy. These also explained the significance of *sneha* and *sveda* approach to *samśamana* treatment.

Other important observations made by the author in the course of his study of the *pañcakarma* therapy are as below :—

Pūrva karma :—

Prior to the resort to *pūrvakarma* and during the *śodhanakarma, pācana, dīpanakasayas* and *gandharvahastādikaṣāya*, were administered as a routine. These were found to be useful, in enabling the patients to tolerate the ordeal of *pūrva and pradhāna karmas*.

The *snehadravyas* used for *snehakarma* were *śhatphalā, Vidāryādi, satāvarī, Sukumāra* and *Indukānta ghṛtas* (refer to the appendix).

The dosages of *ghṛtas* were, in the early stages of this work, tested with *hrasvamātrā* (minimum), 1-2 tola, to test the tolerance of the patient. However, the dosage was considerably increased, the maximum ever reached being 11 tolas, administered in a single dose and on an empty stomach, in the morning. It was found that this dosage was well tolerated until the 4 or 5th day when, *utkleśa* (nausea) was noted in some cases.

Most reliable objective signs of *samyaksneha* observed, among others, were *snigdha twak* (oily skin) and *snigdha purīṣa* (fatty stool) and *utkleśa* (nausea). *Utkleśa* was found to be one of the reliable subjective symptoms. These symptoms were generally followed as criteria of *samyaksneha* in all cases so far studied.

An important point worthy of note is that *samyaksnehalakṣaṇas* did not appear in 7 days, as describedin the *samhitā granthas*, except in one case which tolerate the administration of a much larger dose of *ghṛta*. It took nearly $8\frac{1}{2}$—12 days, in other cases, for these *lakṣaṇas* to appear. This observation is in keeping with *Vāgbhata's* view that *snehapāna* should be continued till the appearance of the *lakṣaṇas* of *samyaksneha* or, in the alternative, the attainment of *snigdhatā* of *koṣṭha*, as can be judged by the examination of *purīṣa* (stool).

Except in the case of *pakṣabadha* and a few other diseases, all the rest were given *Vāṣpasveda* till optimum *svedanam* (perspiration) was noted. This took 10-15 minutes. The appearance of *sveda* (sweat) was considered to be a reliable *samyaksvinnalakṣaṇa*.

A *vamana cūrna*, consisting mainly *madana phala* and *vaca*, was used in divided doses for *vamanakriyas*, in all cases. A *kasāya* consisting of *madhuyaṣṭi* and *lavanajala* were employed to induce vomiting.

The appearance of *pitta* (bile) in the vomitus, as well as the experience of the sensation of *tikta* or *kaṭu* tasted in the mouth (*kaṭukāsyatā*) were treated as *samyakvamana-lakṣaṇa*. In all cases, except in one, the *kaṭukāsyatā* could be noted. Coinciding with the sensation of *kaṭukāsyatā* the patients felt thoroughly exhausted and, hence, further *vamana* was not induced. Even this has proved to be very beneficial.

The number of *vamana vegas* observed in most cases ranged between 3 and 6. The quantity of vomitus was slightly more (in ounces) than the quantity of *vamana-dravyas* and fluids administered to the patients. The quantity of vomitus was measured in ounces; observations made, in this regard, were not in keeping with the requirements, prescribed in the classical literature.

Virecana :

As a routine *Gandharvahastādi kaṣāya* was used to keep the bowels open. Either, *Hiṅgutriguṇa tailam* or a *virecana kasāyam* consisting *drākṣā*, *trivṛt*, *shaya*, *harītikī* in equal parts, were employed for *virecana karma*. The number of *vegas* observed, in the cases studied, range between 3-5 *vegas* which though watery, still exhibited faecal smell. This observation did not conform to the number of *vegas* expected by classical texts.

Paścāt Karma : Except for the shortening of the duration prescribed for *samsarjana karma*, every case was put under *pascāt karma* after the *samśodhana* therapy. It was observed that apetite and hunger of the patients become voracious even when on *peyādikrama*. They began to complain of giddiness and extreme weakness. Hence, *samsarjanakrama* could be followed only for 4 days, in the following manner viz., 1st day, *peya*, second day *vilepī*, third day mudga or *kulathā yūṣa* and the fourth day *māmsa rasa* (meat juice), in the case of non-vegetarian patients. After this, the usual normal diet was given.

Conclusions

It was shown in the introductory section that the *pañcakarma* therapeutics is the back bone of the classical Āyurvedic treatment and that, it has widest possible application. It has been applied not only in the treatment of acute and chronic diseases but also for the prevention of diseases well as for the promotion of health and its maintenance.

It would seem that not only the *samhitā: granthas* but also the much later works as the *Śārañgadharasamhitā* and *Bhāvaprakāśa* have laid emphasis on these therapies, leading to the conclusion that these treatments formed the basis of the practice of medicine uptill relatively recent times. Considering the long span of time, extending possibly to over 2000 years through which these methods of treatment have survived, their survival value may have to be assessed purely from an utilitarian point of view.

In the chapter on theories which are cognate to the study of *pañcakarma* therapy., it was noted that, a careful study of literature has shown that the entire scheme of these basic therapies, is based on an intimate understanding of physiological and pathological sciences. In other words the *pañcakarma* therapy, in its different aspects, are seen to be based on well established and sound theories of physiology, pathology and clinical pharmacology.

It was shown that the *doṣa-dhātumala siddhānta* offers a complete theory of man and life processes. It represents a broad-based generalisation on which the *viśeṣas* of modern medicine can be fitted in appropriate niches in due course of time.

The concept of *vāta*, among *doṣas*, is seen to be of fundamental importance and it is observed that the *sneha* approach to the *vāta* system is logical and scientific.

The concept of *pitta vis-a-vis agni*, in its essential aspects, were elicidated. *Kāyacikitsā* revolves round the concept of *antarāgni*. This has special reference to the pivotal role of *pācakapitta* as regards digestion (*jāṭharāgnivyapāra*), intermediary metabolism (*dhātvagnivyapāra*) and, cell metabolism including synthetic and maintenance metabolism (dhātu caya) and apacaya. It was shown how *pācakapitta* of the *koṣṭha* and its *amśas* in the *dhātūs* are interrelated and are mutually determining. More recent advances in enzymology, relating to cathepsins were pressed into service to illustrate this concept. It was also shown how the impairment of *jāṭharāgni* may result in a kind of chain sequence, in the impairment of *dhātvagnivyāpāra* and *vice versa*.

The concept of *kapha* was studied and it was shown that, in its normal states, it represents the basic matter stuff of the body which bears a close resemblance to the cell protoplasm and protein colloids that compose this structure. Any disturbance, either *vātic* or *paittik*, is reflected in the disturbance of the functions of *kapha*, when, it is seen to behave like *mala*. It was also shown that, in normal states of their functioning, the three forces viz., *vāta, pitta* and *kapha*, balance each other to maintain a steady state.

The *doṣa-dhātu-mala siddhānta* was carefully studied and reviewed.

In the chapter on the *modus operandi* of the development of the disease process, the importance of *agni* and the concept of *āma* and *sāma doṣa* as basic to pathogensis were examined at some length. The restoration of agni, in all its aspects, to its normal functional states and the clearance of the subtle channels of circulation i.e., the *srotāmsi* of *āma* and their removal from the *śakhās* to the *koṣṭha*, and this elimination from here by *vamanādikarma* was discussed.

The concept of *srotas*, which is basic to *pañcakarma* therapy was critically studied. The *srotas* system of the body was shown to resemble the capillary system which is responsible for the distribution of nutrition to cells and the clearance of their waste products. The specificity of *srotāmsi*, as regards the kind of nutrition they transport to particular species of *dhātūs* was stressed with modern scientific data to support it. It was also shown that metabolic states of the *srotāmsi* may lead to *srotorodha* or obstruction to the *srotāmsi*, which, in turn, may become the starting point for the development of the disease process.

The concept of *rogamārgas* or the pathways for the spread of disease and their relation to the *kosṭha*, was carefully examined having regard to the *pañcakarma* measures.

Āyurvedic theories of the evolution of the disease process was discussed and the importance of the fourth *kriyākāla* i.e., *sthānasamsraya vis-a-vis srotovaiguṇyam*, as marking the line of demarcation between a sub-clinical and the clinical stages of diseases was explained. The treatment, preventive or curative, as the case may be, calculated to avert or abort or limit the development of the disease-process, in each one of the six stages of the *kriyākāla* was discussed.

In the chapter of the *pañcakarma* therapy, a general survey of measures of *kāyacikitsā*, having regard to *pañcakarma* therapy was elucidated.

Principles of *samśodhana cikitsā* and its application along with a brief description of appertenances which are now in use in Kerala was attempted.

Relevant material from the three *samhitā granthas* relating to *pūrvakarma* (*snehana* and *svedana*), *pradhānakarma* (*vamana* and *virecana* and *paścātkarma* (*samsarjanakrama*) were extracted, having regard to cases which could be studied in the hospital attached to the Post-Graduate Training Centre in Āyurveda, Jamnagar.

The scope of the *pañcakarma* therapy is comprehensive and this may need many years of study and practical application. None-the less, an effort had to be made, whatever the limitation. A work like this is meant to be carried out not only by one worker but by many. All that the author has attempted to do in this thesis is to initiate enquiry into the manyside nature of the *pañcakarma* therapy. He fully believes that not only the future post-graduates who may come to Jamnagar but in every teaching institution of Āyurveda, will continue this study, backed with experimental work-physiological, biochemical, micro-biological, pathological and clinical.

Ere, concluding this thesis, the author gratefully acknowledges the personal direction and guidance given to him at every stage of the writing of this thesis by Prof. C. Dwarkanath, the head of the Department of *Kāyacikitsā*, Post Graduate Training Centre in Āyurveda, Jamnagar. Regardless of his other scientific, academic and literary preoccupations, he accommodated the author at all hours of the days and nights, and gave him the amount of personal attention that was necessary to enable securing a proper understanding of the subject. He is grateful to Prof. B. V. Gokhale, Principal, Post Graduate Training Centre in Āyurveda, Jamnagar, for affording him the requisite facilities to pursue his enquiry in the hospital attached to the Post Graduate Training Centre. He desires to place on record the valuable suggestions given to him, from time to time, by Shri R. R. Pathakji, Director, Central Institute of Research in Indigenous System of Medicine, Jamnagar. The author is much beholden to Shriyutas C. P. Shukla and T. C. Jain, Assistant Professors in the Department of Kāyacikitsā, Post Graduate Training Centre in Āyurveda, Jamnagar for giving him the advantage of their studies.

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*Details have been given as footnotes in the text itself.

Name of the patient	Main Complaints	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
1. S.P. H.M. Age : 35 yrs. Ad. 22-9-58 Dis. 18-10-58	1. *pratisyāya** 2. Increase in Ṣita Ṛtu. 3. Alpa *Śirah*-śūla. 4. Kāsa (occasionally) 5. Nāsāsrāva 6. Daurbalya (slight)	19 yrs. back got abhighāta on *Śirās* due to a fall. Since then developed *pratiṣyāya* and other vedanās.	19 yrs.	Hypertrophy of *nāsā kalā* and full of *picchila srāva*. Slight rales and rhonchi on the base of the both lungs.	*Duṣṭa-pīnasa*	*Snehana Sukamara ghṛta Samyak-sneha* 9th day (40 tolas) *Vāṣpa-sveda* 3 days. All along *Panchkola* Kaṣāya and *Ganrdharvahastādi*. kaṣāya S.O.S.	*Vamana Vamana cūrna* 1 tola 3 *vegas** intake 60 oz. output 62 oz.3rd *vega* induced by tickling the faeces. *Kaṭukāsyatā*.	*Peyādi krama for* 3 days	*Avara śodhana*

Remarks :—*Patient was relieved of excessive *nāsāsrāva*. He was willing to continue *śamana* treatment at home, so discharged with medicine for *pīnasa*.

*Intake of milk, *vamana cūrna*, *Madhu-yaṣṭi kaṣāya*, *lavaṇajala* etc.
*Output of vomitus.

Name of the patient	Main Complaints	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
2. Miss D. M. H. F. 10 yrs. Ad. 8-3-58 Dis. 28-5-58	1. *Svāsa* 2. *Kāsa* 3. Increased in the morning	Since childhood she used to have attacks of *svāsa* in the morning alongwith slight *kāsa*	Since childhood but pronounced since 4 months.	Expiration prolonged harsha breathing rales and rhonchi in both the lungs all over Clubbing fingers (slight)	*Tamaka-swāsa*	*Snehana* *Vidāryādi ghṛta samyaka sneha* 11th day (17 tolas) given in smaller doses. *Vāṣpa-sveda* 2 days.	*Vamana* *Vamana cūrṇa* 3/4 tolas. Intake 20 oz. output 23 oz. *Kaṭu-kāsyatā.*	*Peyādi-krama* for 3 days	*Avara śodhana*

Remarks :—First the patient was kept on samśamana therapy with no marked improvement. *Śodhana* was given and thereafter *ṣamana* treatment was again continued. Patient was relieved of her symptoms and was not having morning attacks of *svāsa*.

	Name of the patient	Chief Complaints	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
3.	I. Jashab M.M. 48 yrs. Ad. 6-11-58 Dis. 29-1-59	1. *Svāsa* 2. *Kāsa* 3. *Śirahśūla* 4. Increased by *śīta*	Since 4 years patient used to get attacks of *svāsa* in every cold season.	Since 4 years but pronounced since 2 months	Expiration prolonged harsh breathing Rales and rhonchi in both the lungs all over	*Tamaka śvāsa*	*Snehana* *Śatpala-ghṛta samyaka-sneha* 6th day (57 tolas) Bigger dose *ghṛita* was given. *Vāṣpa-sveda.* 3 days *Kasāya* as in case No. 1.	*Vamana* *Vamana-cūrna* 1½ tolas 4 *vegas* Intake 100 oz. output 100 oz. *Kaṭukāsyatā.*	*Dhumrapāna* *Peyādi*krama 3 days	*Avara śodhana.*

Remarks :—First *śamana* therapy.—No marked improvement *Śodhana* was given again, *śamana* therapy continued. Patient was relieved of his symptoms and was discharged as cured.

	Name of the patient	Chief Complaints	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
4.	**V. N.** **H.M. 35 yrs.** **Ad. 7-7-58** **Dis. 11-12-58.**	1. *Svāsa* 2. *Kaphanisīṭhīvan* 3. *Pāndu* 4. *Jvara* (occasionally) 5. *Pādaśoṭha* 6. *Daurbalya* (excessive)	15 yrs. back suffered from *svāsānaka jvara* Preumonia Since 4 yrs. he has been suffering from *svāsa* and *kāsa* with copious *kaphaniṣṭhīvana.*	4 yrs.	*Kaphaṣṭhīvana-* yellow & *pūyavat* (jīrṇa) Harsh breathing Dull on percussion at the base of Rt. lung. Rales at base of Rt. lung.	*Ślesmika kāsa* (jīrṇa)	*Sneha Indukānta ghṛta Samyak sneha* 12th day (42 tolas) *Mṛdu vāsṣpasveda.*	No *Śodhana was* given in view of his excessive daurabalya.	*Peyādi krama* 1½ days.	

Remarks :—Patient was only given *snehana* and *svedana* and his *Koṣṭha* was often and on opened by *gandharva-hastādikaṣāya* and was kept on *śamana* therapy. Improvement was noted and he was relieved of his copious *kaphaṣṭhīvanas svāsa, jvara, pādaśotha* and *daurbalya.* Relieved and discharged.

	Name of the patient	Main Complaints	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
5.	Smt. C. B. H.F. 22 yrs. Ad. 18-8-58 Dis. 19-9-58	1. *Pāṇḍu* 2. *Aruci* 3. *Adhamāna* 4. Tenderness in abdomen 5. *Kaṭi and sakthiruk* 6. *Vibandha* 7. *Śvāsa* on *śrama*	10 yrs. back history of passing *kṛmi* (*Gandūpada.*) 2 yrs. back *āmavāta* 1 year back abortion 2 months back *śvāsa* and other symptoms Strained relationship with her husband.	2 months	*Pāndutā* of nails, tongue, skin, Disastolic soft murmur in mitral area, conducted towards the axilla. Tenderness in *yakṛtpradeśa.* Palpable margin of *Yakṛt.* *Diagnosis* Vātapittaja Paṇḍu	*Vātapittaja Pāṇḍu*	*Snehana* *Dāimādi ghṛta samyak-sneha*, 9th day (42 tolas). *No svedana* *Kaṣāya* as in case No. 1.	*No Vamana* *Virecana* 2 tolas 4 vegas (43 oz. liquid stool but containing faecal matter.	*Peyādikrama* 3 days.	*Ayoga of virecana.*

Remarks :—Patient during *snehana* got pain in *yakṛt* area increased which was relieved by fomentation. In view of the condition of the pt. *svedana* and vaman were not administered. Only *mṛdu virecana* was given which was not resulted in *samyak-virecana* Patient was kept on *samśamana cikitsā* of *agnidhara kāla sāra* (Dr. Dwarakanath et al—Refer—"Antiseptic" June 1957 and was relieved of her *svāsa* and other complaints.

Name of the patient	Main Complaints	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
6. J. L.	1. *Pāmā* at the web of fingers and foot.		10 years	Pustular eruption of *pāmā* on fingers and foot. *Śleṣma-bhuau* (Tonsils) *Vṛddhi* (Hypertrophy)	*Pāmā* (scabies like ?)	*Snehana* *Śatāvari ghṛta, samyaksneha* 9th day (42 tolas) *Vaṣpa-sveda* 3 days *Kasāya* as in case No. 1.	*Vamana* *Vamana-cūrṇa* tola 4 *vegas* intake 72 oz. Output 76 oz. *Kaṭukāsyatā* *Virecana* *Drāksādi virecana* 2 tolas in 4 *vegas*. 52 oz. (liquid stool with faecal smell)	*Peyādi krama* 3 days.	*Avara śodhana*
						SECOND COURSE			
						Snehana *Tikta-ghṛta guggulu samyak-sneha* 8th day (30 tolas)	*Vamana* *Vamana-cūrṇa* 6 *vegas* *Pittadarsana* Intake 79 oz. output 81 oz.	*Peyādi karma* 3 days	*Madhyama śodhana*

Remarks :—Patient went thorough the ordeal well and was completely relieved of itching and pustular eruptions. After *śodhana* he was given *samśamana* and was cured and discharged. Follow up was maintained for over 3 months and the patient was found to be free of the troubles.

Name of the patient	Main Complaints	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
7. M. L. H.Ch. 11 yrs. Ad. 4-12-58 Dis. 2-2-59	1. Inability to work with right upper extremity & lack of control 2. Dragging gait of right lower extremity	3 yrs. back sudden *pakṣabādhā* of rt. side. Since one month more weaknees felt. Doubtful history of Poliomyelitis.	3 years	*Pakṣabādhā* (hemiplegia) of Rt. side. Jerk, exaggerated *Stambha* (rigidity) of muscles claw fingers.	*Vāta-vyādhi* (*Pakṣabādha*)	*Snehana Vidāryādi ghṛta Samyak-sneha* 10th day (52 tolas) *Vāṣpa-sveda 3 day Rasnā-saptaka kaṣāya* all along.	*Vamana Vamana cūrna* 1 tola 4 *vegas* (2 *vegas* at bed) 6 *vegas* Intake 102 oz. Output 108 oz. *Pittadarśana.*	*Peyādi Krama* 3 days.	*Madhyama śodhana*

Remarks :—After *vamana* along with *sneha* as *śamśamana* a course of *piṇḍasveda* was given for 14 days and the patient felt considerable improvement ; could lift wt. of 2-6 lbs. by the paralysed hand ; regained partial control ; could salute. Claw hand was opened upto 15° more. Rigidity less and feeling of strength in the paralysed hand during *piṇḍasveda.* *Gandharvahastādikaṣāya* was given when there was *vibandha.*

	Name of the patient	Main Complaints	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
8.	M. R. H.M. 15 yrs. Ad. 4-8-58 Dis. 9-2-59	1. Inability to work with left upper extremity and lack of control. 2. Dragging gait of left lower extremity Dull in behaviour and mind.	2 yrs. back after fever and convulsion, the boy got the above mentioned complaints. History of occasional akṣepaka (convulsion) Doubtful history of poliomyelitis.	2 years.	1. Pakṣabadha (hemiplegia) of left side. 2. Jerk exaggerated. 3. Stambha (rigidity of muscle) 4. Claw fingers (left hand)	Vātavyādhi (Pakṣabadha after akṣepaka)	*Snehana* Śatpala ghṛita Samyak-sneha 9th day (57 tolas) *vaṣpa-sveda* 3 days. Rasanā-saptaka Kaṣāya all along.	Hingu-Triguṇa taila oz. 5 vegas. (63 oz.) (liquid stool with feacal smell)	Payadi krama 3 days.	Avara śodhana

Remarks :—After samśodhana along with sneha as śamśamana, a course of piṇḍa sweda was given for 14 days and the patient felt considerable improvement ; could lift weight 2-8 lbs. by the paralysed hand ; regained partial control. could salute. Claw hand was opened up to 20°. Rigidity less and feeling of strength in paralysed limb. Dull behaviour was much reduced and during stay in hospital only once he got akshepaka. Gandharwahastadikaśhays was given S.O.S.

Name of the patient	Main Complaints	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
9. M. A. M.M. 30 yrs. Ad. 18-8-58 Dis. 3-10-58	1. *Kaṭiśūla* 2. Weakness	4 years back after a doubtful history of trauma he began to feel gradually *Kaṭiśūla.*	4 years.	Pain in exertion in the region of lower lumber vertebrae No signs of Pott's disease.	*Kaṭiśūla vāta-vyādhi*	*Snehana Pañca-tikta guggula-ghṛta Samyak-sneha* 11th day (48 tolas) *Rasanā saptaka kasāya.*	—	*Peyādi krama* 2 days.	—

Remarks :—After *snehana*, a course of 14 days of *piṇḍasveda* was given and *sneha* as *śamśamana* was continued. Patient was cured of his *kaṭiśūla* and was discharged. *Gandharavahastādikaṣāya* or *Hingu Triguṇa taila* was administred to open the bowel when necessary.

	Name of the patient	Main Complatins	Brief History	Duration	Findings	Diagnosis (Nidān)	*Pūrva-karma*	*Pradhāna Karma*	*Paścāt Karma*	Degree of *Śodhana*
10.	M. L. H.M 23 yrs. Ad. 15-9-58 Dis. 24-11-58	1. *Daurbalya* 2. *Kṣudhānāśa* 3. *Svapnadoṣa* 4. *Mānasika avasāda* (neurotic)	Since 2 yrs. he has been having these complaints. He is a bachelor and family conditions are providing the stress.	2 years.	Nothing abnormal detected organically. However there were complaints	*Arocaka* (*mānasika*)	*Snehana Satāvari ghṛta.* *Samyak-sneha* 8th day (41 tolas) *Pañcakola Kaṣāya* all along.	—	*Peyādi Krama* 2 days.	—

Remarks :—Procedures were **observed** as in case no. 9. with this difference the two courses of 7 days duration of *Piṇḍasveda* was given with **one week** rest in between. Patient felt good appetite and was happy and cheerful. During *Piṇḍasveda* **he developed cold** (*pratiśyāya*) which was cured very soon. He was cured and discharged.

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A. *Kaṣāyas :*

(1) *Gandharvahastādi Kaṣāya*

(Erendamūla, Citraka, Ṣunthi, Haritaki, Punarnavā-mūla, Musali, Puti karanja : equal parts) (Vaidya Yoga Ratnāvali—II. Vishwesharam Shastri, Madras).

(2) *Pañchakola kaṣāya* (Shāraṅgadhara).

(3) *Rāsnā saptaka* (Bhaiṣajya Ratnāvali).

B. *Ghṛtas :*

(1) *Indukānta ghṛta*

(Kaṣāya dravyas :—Karanjatvak, deodaru, daṣamūla.
Kalka dravyas :—Pippali, Cavya, Citraka, Nāgar, Yavakṣāra.
Sneha :—Go-ghṛta
Drava :—Dugadha). (Reference as in No A/1)

(2) Sukumāra ghṛta (Aṣ. Hṛd.)

(3) Vidāryādi ghṛta (Aṣ. Hṛd.)

(4) Ṣatapala ghṛta (Shāraṅgadhara)

(5) Panca ghṛta gugulu (Yoga ratnākara)

(6) Dāḍimādi ghṛta (cikitsa pradeepa—Gokhale)

(7) Ṣatāvari ghṛta (cikitsa pradeepa—Gokhale)

C. *Svedana :*

Balā Kaṣāya for Pinḍa sveda.

D. *Vamana cūrṇa :*

Madanaphala 2 parts, Vaca 1 part, Saindhava part, Madhu Q.S.

E. *Drākṣādi virecana* (Abhayādi)

(1) Drākṣā, Abhayā, Sanāya, Trivrita : equal parts. (Kaṣāya to be prepared in 8 times of water and residue).

(2) *Hiṅgu Triguṇa taila* (Aṣ. Hṛd.)

(Hiṅgu 6 part, Eranda taila 6 part, Sandhava 20 parts Laśuna svarasa 100 parts).

The Indication (in principle) of *Pañca Karma* Therapy in *Cikitsā Sthāna of Caraka Samhitā.*

S. No.	Name of Chapter or disease	Chapter No.	*Vamana*	*Virecana*	*Anuvāsana Basti*	*Nirūha Basti*	*Śirovirecana*	*Śirāvedha*
1.	*Rasāyana*	1 *pada*	×	25	×	×	×	×
2.	*Vājīkarana*	2 ,,	×	×	9	9	×	×
3.	*Jvara*	3	146, 147, 169, 228, 229, 284, 295, 300, 301, 315.	168, 169, 171, 230, 284, 294, 316.	172, 173, 240, 250, 251, 252, 253, 284, 293, 317.	169, 170, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 284, 302, 317, 340.	173, 174, 254, 255, 287, 305, 308, 341.	287, 289, 316, 319.
4.	*Rakta pitta*	4	56	56	×	×	97	
5.	*Gulma*	5	29, 50, 137, 176.	31, 35, 53, 152, 172, 176.	22, 26, 54, 101, 178, 182.	22, 26, 34, 101, 161.	×	32, 36.
6.	*Prameha*	6	25	25	25	×	×	×
7.	*Kusṭha*	7	39, 43	39, 44, 46, 134, 162.	47	×	49	39, 52, 59, 134.
8.	*Rājayakṣmā*	8	82, 118, 157	82	81	×	×	82
9.	*Unmāda*	9	33	33	34	34	34, 36, 72.	24, 100.
10.	*Apasmāra*	10	15	15	15	15	41, 45.	×
11.	*Kṣhtakṣiṇa*	11	×	×	×	×	×	×
12.	*Śvayathu*	12	17, 80	17, 80, 85.	×	18, 85.	17, 80.	100
13.	*Udara*	13	×	61, 68, 69, 77, 90, 118, 121, 137, 142, 133, 173.	64, 65, 67, 68, 77, 87, 90.	63, 77, 87, 90, 174, 175.	×	77, 87.
14.	Arṣhas	14	×	×	130, 134, 183.	137	×	60, 61.
15.	Grahaṇi	15	74, 123, 141.	75, 123, 231.	80, 207.	78, 207.	× ×	× ×
16.	Paṇdu	16	40	40, 135.	136	136	× ×	× ×
17.	Hikka-śwasa	17	75, 85, 89, 121.	87, 89, 121.	× ×	× × ×	77	× × ×
18.	Kāsa	18	83, 108.	34, 85, 150.	32, 34, 155,	34	33, 65, 130.	× × ×
19.	Atisāra	19	× × ×	62, 72.	46, 49, 65, 66, 99, 101, 124.	72	× × ×	× × ×
20.	Chhardi	20	21, 22, 26, 34.	21	× × ×	× × ×	× × ×	× × ×
21.	Visarpa	21	44, 52, 119.	45, 47, 49, 65, 119.	× × ×	× × ×	131, 135, 141.	45, 49, 68, 70, 119, 134.

S. No.	Name of Chapter or disease	Chapter No.	*Vamana*	*Virecana*	*Anuvāsana Basti*	*Nirūha Basti*	*Śirovirecana*	*Śirāvedha*
22.	Tṛṣṇā	22	48	× × ×	× × ×	× × ×	33	× × ×
23.	Viṣa	23	35, 42, 122, 171. 180, 238.	35, 45, 180.	× × ×	× × ×	36, 66.	35, 39.
24.	Madātyaya	24	164	× × ×	204	204	× × ×	× × ×
25.	Divivranya	25	38	14, 38.	38	38	× × ×	44
26.	Trimarmiya	26	11, 26, 54, 58, 150, 155, 187, 204, 220, 286.	11, 19, 20, 49, 58, 90, 102, 147, 187, 204, 220, 285, 286.	11, 19, 45, 58, 72, 181, 220.	11, 16, 45, 54, 58, 72, 181, 220.	124, 125, 151, 158, 176, 183, 204, 286.	181, 204, 289.
27.	Ūruṣtambha	27	× × ×	× × ×	× × ×	× × ×	× × ×	× × ×
28.	*Vātavyādhi*	28	189, 190, 197, 199, 212.	86, 92, 93, 94, 101, 187, 189, 191, 199, 205, 211, 213, 242, 241.	77, 91, 99, 101, 104, 186, 193, 199, 211, 219.	86, 91, 93, 99, 101, 104, 186, 189, 191, 193, 199, 211, 219, 241.	78, 88, 99, 194, 208.	28, 92.
29.	*Vātaśoṇita*	29	46	41, 43, 83, 87, 157, 196, 200, 254, 255.	41, 44, 45, 89.	41, 43, 45, 88, 89.	× × ×	36, 200.
30.	*Yonivyāpat*	30	252, 256.	× × ×	41, 80, 85, 105, 111, 149, 193, 197, 201, 203(including Uttara Basti)	41, 85, 105, 111, 149, 193, 197, 201, 203.	× ×	× × ×

N. B. :—Number of verses (shlokas) noted in each column are from Caraka Samhitā (Cakrapāṇi,) Chaukhamba publications, Benaras.

GLOSSARY

Sanskrit Terms Used in the Thesis on Pañcakarma Therapy.

A

Abala	—A weak person. This may also apply to woman.
Abhighāta	—Trauma or assault.
Abhiṣyanda	—Conjunctivitis.
Abhiṣyaṇāsāṇanagudā	—Discharge of mucus from the nose, mouth and anus.
Abhyantara rogamārga	—Internal pathway of disease.
Accha	—Transperant, clear and light.
Āḍhaki	—A pulse known as red gram (cajanus cajan).
Adhmāna	—Flatulence.
Adhogata rakta-pitta	—Bleeding from lower parts of the body e.g., conditions like melena and haemeturia.
Adhojihvikā	—Uvulitis.
Adhvahata	—Fatigue due to excessive walking.
Adhyayana prasakta	—Excessive indulgence in studies.
Adṛṣṭa snehadarśana	—Absence of fat in the faeces.
Agnidagdha	—Burns and scalds.
Agni-dīpti	—Promotion of the factors of digestion (enzymes ?).
Agniduṣti	—Impairment of the factors concerned with gastro-intestinal digestion, on the one hand and metabolism of the foods, on the other.
Agnimārdava	—Lowered activity of the factors of digestion and metabolism.
Ajīrṇa	—Impaired digestion.
Ajīrṇabhukta	—Indulgence in food when suffering from indigestion.
Ajīrṇī	—A patient suffering from impaired digestion.
Āhāra	—Foods and drinks or in a word, diet.
Akāla	—Out of season.
Ākāśa	—One of the five gross elements (mahābhūtas). It refers to the property of space and the tenuous matter that occupies it. Vibration and sound are the properties ascribed to it.
Akṣi-roga	—Diseases of the eye.
Akṣi-śūla	—Shooting pain in the eyes.
Alasaka	—Meteorism.

Alocaka	—One of the five functional groups of pitta stated to be located in the eye and considered to be responsible for vision and particularly colour perception.
Alpāgni	—State of impaired digestive factors (low enzymatic activity).
Āma	—At the level of gastro-intestinal digestion, this term refers to the products of impaired digestion which are considered to be toxic in nature and at metabolic levels, it refers to the products of impaired metabolism (of sugar fat, or protein metabolism).
Āmadoṣi	—A patient suffering from āma.
Āmaviṣa	—Toxic substances of intestinal and metabolic origin.
Ambu	—Water.
Amla	—Sour/acid.
Amlaphala	—Sour fruits.
Amūrta	—Formless, incorporeal.
Ānāha	—Distension of the abdomen due to constipation and flatulence.
Anāmayatā	—Disease-free state.
Anatimahatīvyathā	—Bearable pain or not much pain.
Anavasṭhita	—Unstable.
Aṇḍavṛddhi	—Hydrocele.
Angadaurbalya	—Asthenia.
Aṅgalāghava	—Lightness of the body.
Aṅgamarda	—Body ache.
Anilakopa	—Provocation of vāta (analogous to nervous disturbances).
Anuvāsanabasti	—The introduction of medicated fats/oils or plain fats/oils into the bowel through the rectal route with the aid of an apparatus made of the bladder of a goat, sheep or buffalo to which is attached a canula, made of metals, wood or bamboo.
Anyavikāra	—Other diseases.
Apāna	—One of the five regional and functional divisions of biological vāyu which is said to be responsible for controlling the movement of bowels, passing of urine, uterine contraction, expulsion of foetus, menstruation and ejaculation of the semen.
Apaprasūtā	—A female subject given to repeated abortion and miscarriage.

Apasmāra	—Epilepsy.
Apatānaka	—Tetanus.
Apatarpaṇa	—A theraputic measures for the reduction of the body bulk viz., obesity.
Apraguṇavāta	—Slight impairment of nervous system.
Apravāta	—A place with moderate air currents.
Arbuda	—A malignant tumor.
Ardita	—Facial paralysis.
Arjaka	—Ocimum *basilicym.*
Arka	—Calotropis *procera.*
Arocaka	—Distaste.
Arśas	—Haemorrhoids.
Artha	—This term generally refers to the objects of the senses. It also refers, to wealth and a means for the enjoyment of life.
Asamhatavarca	—Not well formed faeces.
Asanghata	—Incorporeal or formless.
Asātmyendriyārtha-samyoga	—One of the three main aetiological catagories. It refers to the hyper-hypo and perverse co-relations of the five senses with their respective objects.
Asneha	—Non-oleated.
Asthāpita	—Treated with nirūhabasti.
Asthāyi	—This term literally means temporary or transient. It usually qualifies the term *dhātū* and the combined term, *asthayi-dhātū*, referred in the classical literature, pertains to metabolically processed tissue nutrients.
Asthiśūla	—Pain in the bones.
Āsṭhita	—To be seated.
Ātapa	—Sunlight.
Atasī	—Linseed.
Atinīcopādhāna	—Thin pillow.
Atirūkṣa	—Excessive dryness.
Ati-samstiti	—Sedentary habit.
Atisāra	—Gastro-enteritis.
Atiśūla	—Excessive pain-shooting and piercing in nature.
Atisnigdha	—Excessively oleated.
Atisthūla	—Excessive corpulence.
Ativiṣa	—Aconitum *heterophyllum.*
Attyuccopādhāna	—Thick pillow.
Auṣadha vibhramśa	—Lack of regularity in taking medicine.

Avaikārika	—Non-pathogenic.
Avalambaka	—One of the five kaphas which is stated to support the heart by nourishing it and controls the fluid balance of the body.
Avipāka	—Indigestion.
Avyakta	—Imperceptable or beyond the range of sensory perception.
Ayāma	—Length.
Atyaśna	—Excessive indulgence in food.
Ayanamukhāni	—The description of ayanamukhāni available in the Āyurvedic classics resembles that of capillary pores.
Amṛta	—Tinaspora cordifolio.
Atyagni	—This term carries two meanings viz. acute digestion and hypermetabolism as in hyperthyroidism.
Atyanta sandhipīḍa	—Intense joint pain.

B

Bahala	—Excessive
Bāhyarogamārga	—External pathway of disease.
Bala	—This term has two connotations viz., (1) capacity to perform work. (2) Resistance to disease and decay.
Balahāni	—Loss of strength and resistance to disease.
Bālaka	—Infant or child.
Basti	—This term literaly means the bladder. In the context of theraputics, it refers to the introduction of medicaments into the bowels through the rectal route, with the help of an apparatus devised with bladders of such animals as baffalo, goat etc.
Bastiroga	—Diseases of bladder.
Bhagandara	—Fistula-in-ano.
Bhaktaṣraddhā	—Relish for food.
Bhārahata	—Exhaustion caused by weight lifting.
Bhārṇgi	—Clerodendron *serratum*.
Bhayopatapta	—Afflicted with fright.
Bheda	—This term refers to division, breaking, splitting and differentiation. In the context in which it has been used in this thesis, it refers to the 6th stage in the evolution or natural history of the disease when it may terminate in cure leading to convalance or develop complications or become chronic or serve as the cause for other diseases or in death.

Bheṣaja	—Therapy., This term also refers to theraputic measures and medicinal formulations.
Bhrājaka	—One of the 5 pittas located in the skin and stated to be responsible for the skin-health and the promotion of complexion.
Bhrama	—Vertigo.
Bhūtāgni	—Latent heat locked up in (nutrient) molecules which is stated to be activated in the process of gastro-intestinal digestion. These molecules have been classified under five distinct physical groups viz., pārthiva, apya, āgneya, vāyaveeya and nabhasa. The latent heat has been named after the category to which the molecules belong. i.e., pārthivāgni apyāgni etc. The activation of the latent heat is considered necessary to enable the molecules to corss the intestinal barrier, the capillary wall and the semi-permeable cell-membranes. According to some authorities, bhūtāgni-pāka or the reactions of bhūtagni are comparable to anerobic respiration.
Bhūtakeśi	—Mussaenda *frondosa.*
Bhūtṛna	—Andropogon *martini.*
Bodhaka	—One of the five kaphas which is stated to be responsible for taste-perception.
Bradhna	—Hernia.
Brihmaṇa	—Fatening therapy.

C

Cardi	—Vomiting.
Cardita	—The act of vomiting.
Cardyardita	—Suffering from vomiting.
Caturangala	—Castor plant (Ricinis *communis*).
Cayapūrvaka vṛddhi	—The state of accumulation of morbific factors that is stated to precede its actual acumulation.
Cikitsā	—Treatment in general and treatment for elimination of the cause of the disease in particular.
Cintaka	—Given to worrying.
Cintāprasakta	—Same as chintaka.
Cintita	—Worried.
Cittavibhrama	—Mental derangement.
Cukra	—Salad with vineger and sour tasting leafy vegetables.

D

Dāha	—Burning sensation.
Dāruṇa	—Acute, severe.
Dehakaṭhinya	—Hardness of body.
Dīptāgni	—Improved digestive capacity.
Devadāru	—Cedrus *deodar*
Dhamana	—Filling, blowing, pulsating.
Dharma	—Virtue, duty, law.
Dharmārdita	—Duty conscious.
Dhātu	—This term generally refers to the factors that support the body. In the context in which it has been used in this thesis, it carries two meanings viz., 1. Existing formed tissues of the body. 2. Their specific metabolically produced nutrient homologues precussors.
Dhātvagnipāka	—Metabolism.
Dhātvagni	—This term conveys an idea similar to that of enzymes. It stands for tissue—specific enzymes.
Dhūma	—Smoke.
Divāsvapna	—Day sleeping.
Doṣa	—The functional factors of the living body classified under Vāta, Pitta and Kapha.
Doṣapratyanīka	—The therapy for counteracting the cause of the disease or of the elimination of the cause, of the disease.
Drava	—Liquid.
Dugdha	—Milk.
Dugdha, dadhi, madhu, sneha pīta	—Subject to whom milk, curd, honey and oil have been administered.
Durbala	—This term refers to weakness and poor immunity.
Durdina	—Cloudy, dark and rainy days.
Durvarṇatā	—Impaired complexion.
Duscardana	—Emitics not properly administered.

E

Ekāngaghāta	—Hemiplegia.
Elā	—Cardomam.
Elādi	—A pulvis of cardomom etc.
Eraṇḍa	—Castor plant (Ricinis *communis*.).
Eraṇḍa mūla	—The root of Ricinis *communis*.

G

Gāḍhavarca	—Hard faeces.
Galagaṇḍa	—Same as ganda.
Galagraha	—Sore throat.
Gaṇḍa	—Scrofula.
Gandha dravya	—Aromatic subtances.
Garapīḍita	—Afflicted by food poisoning.
Garapīḍa	—Food poisoning.
Garbhadoṣi	—Defective foetus.
Garbhiṇī	—A pregnant woman.
Gaurava	—Heaviness.
Gauravanigraha	—Removal of the heaviness of the body.
Ghrāṇasrāva	—Running of the nose.
Ghṛta	—Ghee (clarified butter).
Glāni	—Brain-fag.
Graha	—Diseases, particulrly of children, attributed to invisible forces such as disembodied spirit.
Grahaṇidoṣa	—Impaired functioning of the phyloric sphinter and the small intestine.
Grahaṇirogī	—A patient suffering from mal-absorption syndrome.
Granthi	—Glandular enlargement, adenopathy.
Grathita purīṣa	—Scabilae.
Gudabhraṁśa	—Prolapse of the rectum.
Gudadāha	—Burning sensation in the anus.
Gudapāka	—Proctitis.
Guggulu	—Commiphora *mukul.*
Gulma.	—Abdominal tumour.
Guru	—Heavy. This term also refers to substances that are not easily digested.
Gurugātratā	—Heaviness of body.

H

Halīmaka	—A clinical variety of jaundice, resembling infective hepatitis, described in Āyurveda.
Hareṇuka	—Piper *aurantiacum.*
Haridrā	—(Turmaric) Curcuma *longa.*
Hayānaka	—A variety of paddy which is harvested in an year's time.
Hemanta	—Winter season.

Hikkā	—Hic cough.
Hima	—Cold.
Hṛśuddhi	—A subjective feeling of cleanliness of the heart (chest).
Hṛdayaśuddhi	— -do-
Hṛdroga	—Heart disease.
Hṛllāsa	—Nausea.
Hṛtpīḍa	—Discomfort and pain in the praecordial region.

I

Ikṣuvāka	—Leganaria *vulgaris.*
Indriya	—This term refers to senses-both cognitive and coniative.
Indriyajāḍya	—Impairment of sensory functions.
Indriyasamprasāda	—A subjective feeling of clearness of the senses.
Indriyaśuddhi	— -do-.
Itcata	—Alangium *decapetalion.*

J

Jaḍatā	—Inertness of the body.
Jaghana	—Gluteal region.
Janghāpīḍā	—Pain in the leg.
Jānupīḍā	—Pain in the knee joint.
Jaṭharāgni	—This term refers collectively to digestive secretions of the stomach and small intestine.
Jīmūlaka	—Luffa *achinata* Roxb.
Jīrṇajvara	—Chronic fever.
Jīrṇakoṣṭha	—This refers to the gastro-intestinal tract after the completion of the digestion of food.
Jīrṇātisāra	—Chronic diarrhoea.
Jwara	—Pyrexia, fever.

K

Kaca	—Cataract of the eye.
Kākāmāci	—Solauum Nigrum.
Kākolyādi	—A group of eight drugs esteemed as rejuvinaters the identity of which are disputed.
Kālaja	—Seasonal. The context in which this term has been used in the thesis refers to seasonal influence of resistance to diseases.
Kālamala	—Ocimum *sanctum.*

Kālapratīkṣaṇa	—Waiting for turn.
Kālavega pravṛtti	—Properly timed natural urges.
Kalāya	—Pea, Pisum *sativum.*
Kāleya	—*Aquilaria agallocha.*
Kāma	—This carries two meanings, viz., (1) desire. (2) libidunal impulses.
Kāmādivyagra	—Indulgence in erotic pursuits.
Kāmalā	—Jaundice.
Karṇasrāva	—Otorrhoea.
Kaṇḍū	—Itch.
Kaṇḍūpamardita	—One afflicted by scabies and itch.
Kānji	—Gruel.
Kaṇṭhapāka	—Inflamation of the throat.
Kaṇṭhapīda	—Parched throat with pain.
Kaṇṭha śotha	—Inflamation of the throat.
Kaphapraseka	—Salivation.
Kapha samsthāna	—Kapha system.
Kaphasthānajanyaroga	—Diseases that have their origin in the sites of kapha.
Karanja	—Pungimia glabera. A variety of charumofficinarum.
Karbura	—This term refers to the varigated colours also.
Karmahata	—Fatigue due to over work.
Karṇaroga	—Ear diseases.
Karṇa śūla	—Ear ache.
Karśyanitya	—Indulgence in sliming procedures.
Kāsa	—Cough. It includes laryngitis, bronchitis etc.
Kāsamarda	—Cassia *Occidentalis.*
Kaṣāya	—There are two implications of this term viz. (*a*) Astringent, (*b*) Decotion.
Kaṭigraha	—Catch in the lumbo-sacral region.
Kaṭu	—Pungent, sharp, acrid. This term is sometimes used as a synonym of bitter.
Kāyacikitsā	—An important branch of Āyurveda which seeks to treat diseases involving metabolic disturbances. It refers, in general, to internal medicine.
Khalli	—Gout.

Khara	—Rough.
Kaṭhina	—Hard, tough.
Khavaiguṇya	—Impairment of the structure and functions of the srotas (capillaries) in particular and circulatory path-ways, in general.
Kiṇva	—A ferment like yeast.
Klāmayukta	—Brainfagged.
Kledaka	—One of the five kaphas described in Āyurveda, said to be secreted in the stomach which is stated to moisten the food and aid its further breakdown. The nearest analogy to kledaka is the mucin secreted in the fundus of the stomach.
Kodrava	—A variety of cereal cultivated in dry areas (Paspalum *serbiculatum*).
Kola	—Zizyphurujjujuba diseases.
Koṣta	—The abdominal cavity, in general and the gastro-intestinal tract, in particular.
Koṣṭhānāha	—See anaha.
Kotha	—Suppuration.
Kramenavit	—Delayed evacuation of the bowel.
Kṛmikoṣṭha	—Worm infestation.
Kriyākāla	—This term literally means the time for action. It has been used, specially, as a technical term to signify different stages of the evolution of the disease (natural-history of the disease) with a view to the adoption of radical or palliative measures, according to the stage of the disease. Generally, six phases of the evolution of the disease have been envisaged. The first three refer to the formative and pre-prodromal sub-clinical stages, the fourth phase referes to the stage of prodromal symptoms ; the fifth phase referes to the clinical phase and the sixth, to the mode of termination of the disease.
Krūra koṣṭha	—A hard bowel.
Kṛṣa	—Lean.
Kṛśara	—A kind of rice gruel.
Kṛtavedanā	—Causation of pain.
Kṛtavirecana	—Patient subjected to purgation.
Kṣama	—Leanness.
Kṣata	—Trauma.

Kṣāradagdha	—Cauterisation with powerful caustics.
Kṣatagudā	—Anal fissure.
Kṣīna	—Weakness, exhaustion.
Kṣudhita	—Afflicted by hunger.
Kṣīṇojas	—Inadequacy of ojas,—the factor of resistance to disease.
Kṣutnigraha	—Suppression of hunger.
Kukṣiśuddhi	—Cleansing of the abdomen.
Kukṣigraha	—Catch in the epigastic region.
Kulatha	—Dolichos *biflorous*.
Kūrchika	—A buttermilk preparation.
Kuṣṭha	—Refer kuitina.
Kuṣṭhina	—This term refers in general to skin diseases such as excema, psoriasis and such other obstinute skin diseases and in particular leprosy.

L

Laghu	—Light articles of food that are easy of digestion.
Laghutā	—Lightiness of the body.
Langhana	—Slimming therapy.
Lavaṇa	—Salt, saline.
Lodhra	—Shympan *racimose*.

M

Madārtita	—Intoxicated.
Madātyaya	—Alcoholic intoxication.
Madhu	—Honey.
Madhura	—Sweet.
Madhumehī	—Diabetic.
Madhuraphala	—Sweet fruits.
Madhyama	—Moderate or medium.
Madhyama bala	—Generally moderate strength and, in particular, moderate resistance to disease.
Madya sevi	—Alcohol addict, alcoholic.
Madyavikārī	—Addiction to alcohol.
Mahādoṣa	—Afflicted by the excessive impairment of tridoṣas. It It also refers to urinary anomalies.
Maiṭhuna prasakta	—Indulgence in sex act.
Majjā	—Marrow tissue.
Mala	—Faeces, urine, sweat and metabolic-wastes.
Mālatī	—Jasminum *grandifloium*.

Mala sancaya	—This term carries two meanings according to the context in which it is used viz., 1. Faecal accumulation. 2. Accumulation of metabolic wastes of the body due to non or faulty elimination.
Māmsa	—Muscle tissue.
Māmsarasa	—Meat juice (soup).
Mānasikaroga	—Diseases of the mind.
Manda	—Slow, dull.
Mandāgni	—See agnimāndya.
Manyāśūla	—Pain in the back of the neck.
Mārdavānutpāda	—Lack of softness of the body.
Mārga śuddhi	—Cleansing of the pathways, specially the circulatory channels.
Marmapīḍita	—Involvement of vital parts of the body.
Māṣa	—Black gram. (Phaseolus mungo).
Māṣaka	—Moles.
Masūra	—Lentil.
Medas	—Adipose tissue.
Meḍhrapāka	—Inflamation of the male genitallia.
Moha	—Confusion.
Mūṣikaparṇi	—Ipomoea reniformis.
Mṛdu	—Soft.
Mṛdukoṣṭha	—Soft bowel.
Masṛṇa	—Soft.
Mudga	—Green gram (Phaseolus aureus, Roxb.).
Mukha nāla	—A tube with opening at both ends.
Mukharoga	—This term refers to diseases of the mouth, in particular and face, in general.
Mukhasrāva	—Excessive salivation.
Mūrchā	—Coma.
Mūrchita	—Comatose.
Mūrdha Śuddhi	—A subjective feeling of clearness of the head.
Mūtra	—Urine.
Mūtra sanga	—Retention of urine.
Mūtraghāta	—Retention of urine due to obstruction.
Mūtrakṛcchra	—Dysuria.
Mūtrakṛchra	—Stricture urethra.
Mūtrapāna	—The administration of urine by mouth.

N

Nāsāroga	—Diseases of the nose.
Naṣṭa sanjña	—Loss of consciousness.
Nātibahvāśana	—Eating in moderation.
Navajvara	—Acute stage of fever.
Navaprasūta	—New born.
Navapratishyāya	—Early stages of naso-pharyngeal-catarrh.
Nīlika	—Black patch on the forehead or the face.
Netradāha	—Burning sensation in the eye.
Netraroga	—Eye diseases.
Nidrāhāni	—Insomnia, loss of sleep.
Nidrāhati	—Excessive sleepishness.
Nirūha	—A subject on nirūha-basti.

O

Ojas	—The biological principle of immunity said to be metabolically produced and present in the circulating blood.
Oṣthapāka	—Inflammation and ulceration of the lips.

P

Pādagraha	—Catch in the foot.
Padayātrā	—Travel by walking.
Padmakāṣṭha	—Prunus *padum.*
Pakṣabadha	—Hameplegia.
Pañcakarma	—Five fold theraputic measures comprising the administration of oily medicaments, sweating, emetics, purgatives and the introduction of decoctions and oily medicaments through the rectum. These therapies are sometimes employed as preparatory measures for the main therapy and sometimes, as the main therapy itself.
Pāṇḍurogā	—A syndrome which resembles the description of anaemia.
Pāṇḍutā	—Pallor.
Pāṇi	—Hand.
Pārśvaśuddhi	—A subjective feeling of freedom and cleanliness of the flanks.
Paravṛtti	—Irreversible reactions.
Paridāha	—Burning sensation.
Pariṇamana	—Reversible reactions.
Pārśvagraha	—Catch in the flanks.

Pārśvaśūla	—Pain in the flanks.
Pāyasa	—A preparation of cereals prepared with milk.
Pīnasa	—Sinusitis.
Phenilopagama	—Appearance of froth in the mouth.
Picchila	—Slimy, viscous.
Pīḍaka	—Boils.
Pīḍaka pīdita	—Afflicted by boils.
Pipāsita	—Thirsty.
Pipāsā	—Thirst.
Pippali	—Piper *longum*.
Pitta	—Biological factors responsible for digestion and metabolism (similar to enzymes).
Pittamehī	—Diabetes in which pitta is the dominant factor.
Pittotkleśa	—Billiousness and nausea.
Pittaprakopa	—Provocation/excitement of pitta and its circulation through channals other than its own.
ittapravṛtti	—Appearance of bile.
Pittasthānajanya	—According to the context, this term refers either to billiary disturbances or metabolic disturbances or diseases which may have their origin in the pitta organisations of the body.
Pitta vikāra	—Diseases due to the impairment of pitta.
Pizhichal	—Pouring medicated oils on the body as a whole or on the affected parts, followed by massage, fomentation etc.
Prasara	—To spread.
Pūtinasa	—Parasmia.
Poṣaka	—That which nourishes.
Poṣya	—That which is nourished.
Plīhodara	—Spleenomegaly.
Prakopa	—This term refers to the spread of the doṣas through pathways other than their own.
Prameha	—Polyurea, in general and diabetes, in particular.
Pramehī	—Diabetic.
Prāṇa	—Generally *elan vital.* It also refers to one of the five vayūs located in the head and courses through the throat and thorax; stated to be responsible for intelligence, feelings, regulation of sense organs, heart, respiratory movements, winking of the eyes, secretion of saliva and deglutition etc.
Prapauendareeka	—Nelumbium *speciosum*.

Prasaktacardi	—Nausea.
Prasaktamūrdhā vāta	—Involvement of the head by vāta.
Prabhūtasnehanitya	—Over indulgence in fatty substances.
Praseka	—Salivation.
Pratiśyāya	—Nasopharangeal catarrh.
Pravāhikā	—Dysentry.
Pravara	—Optimum or high.
Pṛthvi	—Solid state.
Pṛṣṭhagraha	—Catch in the loins.
Purīṣavipākvatta	—Well formed faces.
Puṣpita	—A woman in menses.
Pūya	—Pus.

R

Raja	—Dust.
Rājayakṣmā	—Pthysis.
Rakta	—Blood.
Rakta candrikopagama	—Red and shining rashes.
Raktakṣīṇa	—Loss of blood.
Raktamaṇḍala darśanam	—Seeing red patches.
Raktapitta	—Haemorrhagic states.
Raktaprakopa	—Impairment of the blood.
Ranjaka	—One of the five pittas which resembles the description of (*a*) Castle's intrinsic factor. (*b*) Anti-anaemic factor of the liver viz., B_{12}
Rasa	—Circulating fluid of the body resembling the description of plasma.
Rasnā	—Many drugs go by the name Rasna. Of them Pluchea *lanceolata* and *Vanda roxburgi* have been found to give the actions ascribed to these drugs.
Rasauṣadha	—Mercurial, metalic and mineral-preparations.
Rasāyana	—This is a special therapy for the arrest of the process of ageing and rejuvenation of the tisssues.
Rātriśayana	—Night sleeping.
Ridhi	—One of the eight rasāyana drugs.
Riktakoṣṭhatā	—Intestine freed of its contests.
Rūkṣa	—Dry.
Rūkṣabheṣaja	—Dry drug or medicament.
Rūkṣa gātratā	—Dry body.

Rūkṣānna	—Dry food.
Rūkṣapāna	—Dry drink.
Rūkṣapurīṣa	—Dry faces.

S

Śālvaṇadravya	—Drugs for Śālvaṇā sweda.
Sālvaṇa	—A special kind of poultice.
Śalyārdita	—Disturbances caused by the presence of foreign body.
Samsarjana	—A scheme of dieting which forms part of post-pañcakarma therapy.
Samśodhya	—Subjects in whom radical therapy for the elimination of the morbific factors of the disease is to be carried out.
Samyakkṣīṇa	—Highly emaciated.
Sāmyatā	—State of equilibrium (homeostasis)
Sancaya	—This term literally means accumulation. As a technical term employed in Āyurveda, it refers to the accumulation of doṣas in their own sites.
Sandhi pīḍā	—Joint pain.
Sāndra	—This refers to the property of being dense, formed, firm or compact.
Sankoca	—Contraction.
Santarpaṇa	—Fattening and nourishing therapy; opposed to apatharpaṇa or slimming therapy.
Saptalā	—Euphorbia Tirucalli.
Saral	—Euphorbia *ipmoea batatas.*
Saraṇa	—Refer to sāra.
Ṣarīradāha	—Burning sensation in the body.
Sarpadaṣṭa	—Bitten by snake.
Sarṣapa	—Mustard.
Sarvāngaghāta	—Paraplegia.
Satahava	—Pimpinella *anisum.*
Ṣakha	—This term generally refers to the perepheral parts of the body. As a technical term, the context in which it has been used, it comprehends rasadhātu, raktadhātu etc. and the skin. These dhatūs etc. constitute the external or peripheral pathways of disease. (Bāhya-rogamārga).
Śālākya	—This term refers to diseases in which probing (śālāka) is necessary. However, in the present context, it refers to a special branch of Āyurveda which deals with medical and surgical treatment of eye, ear, nose, throat and mounth.

Śalya	—This term refers to foreign bodies. It also refers to general surgery which forms an important discipline of the Aṣṭāṅga Āyurveda.
Śarīrāsadana	—Body ache.
Śastrakṣata	—Injury by weapons.
Śhīta vīrya	—Generally cold in potency. As a technical term employed in Āyurveda, it resembles the description of potential energy.
Śītānuparama	—Susceptible to chills.
Śigru	—Drumstic, Moringa *pteriogospermea.*
Śīta	—Cold, chilly.
Śirahśūla	—Headache.
Śoka	—Grief.
Śūla	—Piercing pain.
Śotha	—Refers to shvayaṭhu.
Śrama	—Fatigue.
Śyāmaka	—Panicum miliare.
Śyāma	—*Operculina* turpethrum.
Śirahṣūla	—Headache.
Śirīṣa	—Acacia *speciosa.*
Śiroroga	—Disease of the head.
Śitavyuparama	—Freedom from chill.
Ślakṣṇa	—Smooth. It refers to the smooth surface of a hard substance.
Ślīpada	—Elephantiasis (Filariasis).
Śleṣmotkleśa	—Nausea accompanied by spitting of mucous.
Sneha	—Oil.
Snehabasti	—Refers to basti.
Snehadyanupaskrita	—Persons not treated with oleation therapy.
Snehamlāna	—Fatigue caused by oleation therapy.
Snehana	—The administration of medicated oils and ghees-both internal and external.
Snigdha	—Unctuous.
Śoṣa	—Wasting.
Sphoṭaka	—Boils.
Sphoṭa pīḍita	—Afflicted with boils.
Sphoṭotpati	—Occurence of boils.
Śrānti	—Physical fatigue.

Srāvaṇa	—To ooze, to exude, to filter through, to transude, to premeate through.
Sṛngātaka	—A variety of nut.
Srotas	—Fine body channels through the walls of which oozing etc. is stated to occur.
Srotoviśuddhi	—The cleansing of srotas or pathways ; channels.
Srotoduṣṭi	—The impairment of srotas.
Srotonirmalatva	—Clear pathways, channels of circulation of tissue-nutrients.
Stabdhasandhiceṣṭa	—Rigidity of joints and restricted movements.
Stambha	—Rigidity.
Stambhanigraha	—Overcoming rigidity of body or its parts.
Stanyadoṣa	—Impairment of the quality of the breast milk.
Stambhanīya	—Drugs that cause binding or coagulation.
Sthāna	—Seat, locus, site.
Sthānasamshraya	—This term literally means to become displaced. As a technical term, it refers to the localisation of the doṣās (morbid factors) in sites other than their own and the initiation of the disease in such sites.
Sthāyi	—Permanent, fixed.
Sthira	—Firm, sturdy.
Strīnitya	—Sex indulgence.
Sthūla	—This term is the opposite of sūkshma and refers to things in their gross state-macroscopic.
Subhaga	—Good looking.
Śuddhavātaroga	—Diseases of the nervous system.
Śukla	—White.
Sukhocita	—Subjects for whom comforts are indicated.
Śukradoṣa	—Seminal defects.
Śukraghāta	—Low secretion of male reproductive elements.
Sukrakṣīṇa	—Loss of semen.
Sūkṣma	—Subtle, beyond sensory perception, microscopic.
Śukta	—Vinegar.
Śuktapāka	—The term śukta refers to veneger and pāka to transformation or change. Śuktapāka therefore, refers to reactions that involve fermentation.
Sukumāra	—Tender and delicate.
Śūlavyaparama	—Freedom from pain.
Supti	—Loss of sensation.
Sura	—Toddy.

Surasa	—Ocimum *sanctum.*
Surasādi	—A group of drugs starting with Basilicum.
Sūtā	—Woman in purperium.
Svaradaurbalya	—Weakness of voice.
Svarahāni	—Aphonoea.
Svaropaghāta	—Aphonia.
Śvāsa	—Dysponea, breathlessness.
Svasṭhavṛtta	—The science that deals with the regimen for healthy life. Health, in this context, refers to physical, sensory, mental and spiritual.
Svayathu	—Swelling or oedema.
Swedābhāva	—Absence of sweating.
Svedana	—The therapy by which sweating is promoted by the application of heat in various forms viz. dry, moist etc.
Svedya	—Refers to subjects who are subjected to sweating.
Śyāvamandaladarśana	—Occurence of round black patches.
Śyoṇaka	—Oroxylum *indicum.*

T

Takrāriṣṭa	—A fermented preparations of buttermilk.
Tāluśoṣita	—Dry mouth.
Tama	—Black out.
Tandrā	—Leathargy.
Tandrāhati	—Laziness.
Tāpa	—Heat.
Taruṇajvara	—Acute phase of fever.
Tīkṣṇa	—Sharp.
Triphalādisvarasa	—An aquoeous extact of three myrobalams.
Tikta	—Bitter.
Tila	—Gingely or sesamum seed.
Timirapīḍita	—Afflicted by contract of the eye.
Tṛṣānigraha	—Volitional suppression of thrist.
Tṛṣita	—Thirsty. Refer also to trishṇā.
Tṛṣa	—Thirst.
Tvakprasāda	—Smoothness of the skin.
Tvak snigdhatā	—Oleated skin.

U

Uccavāchāra	—Loud speech.

Udāṇa	—One of the five vayūs having its main seat in the thorax which course upward to the nose, pharynx and downward to umbilicus. It is considered to be responsible for the production of voice, speech, song etc.
Udara	—The literal meanings of this term is abdomen. It also refers to ascites, generally associated with liver and spleen pathology.
Udararogi	—A patient suffering from ascites.
Udāvarta	—Flatulence associated with constipation.
Uddala	—An inferior variety of cereal.
Ullekhana	—This term refers in general to scrapping. It also means alimming.
Unmatta	—Insane.
Unmāda	—Insane.
Upajihivikā	—Uvulitis.
Upnāha	—Poultice.
Upavāsaprasakta	—Indulgence in fasting.
Ūrdhvajatruroga	—Diseases pertaining to parts above the neck.
Ūrdhvaga raktapitta	—Haemoptysis.
Urovidāha	—Heart burn.
Urugraha	—Rigidity of the thigh.
Ūrupīḍa	—Pain in the thigh.
Ūrustambha	—Paraplegia.
Ūṣṇa	—Hot.
Ūṣṇābhilāṣā	—Craving for hot substances.
Ūṣnodakopacāra	—Treatments with hot water.
Utsanna kapha	—Increase of kapha.
Uttamāgnibala	—Optimal digestive and metabolic states.

V

Vacadi	—A group of drugs with acrus *calamus* as the main ingredient.
Vaiṣamya	—Impairment, imbalance.
Vājīkaraṇa	—Therapy for the promotion of virility.
Vākya nigraha	—Inability to or obstruction to pronounciation of words properly.
Vallīphala	—Pumpkin and such other fruits belonging to *cucugberacea* family.
Vallūra	—Dried meat.

Vamana	The production of vomiting by the administration of drugs.
Vamśa	Bamboo.
Vamśa lochana	Bamboo salt.
Varaka	Paspalum *scorbitulatum.*
Varaṇaka	Crataeva *religiosa.*
Varṇahāni	Loss of complexion.
Vasā	Muscle fat.
Vāsaka	Adhathoda *vasika.*
Vasanta	Spring season.
Vātahara dravya	Drugs like devadaru (deodar) balā Cīda *cardifolia*, Cida *retusa* etc. employed in the treatment of nervous system diseases.
Vātakantaka	A clinical condition marked by pain in the heel due to exhaustion or misplacement of foot.
Vātānulomana	Drugs that enable the downward movement of gas.
Vātarakta	Gout and/or neuritis.
Vātasanga	Retention of flatus.
Vega dhāraṇa	Volitional suppression of natural urges such as defecation, micturition, sleep, sneezing, yawning, breathing, hunger, thrist, cough, hiccough and erructation etc.
Vegasyātipravṛti	Forced elimnation of faeces, urine etc.
Vegavibandha	Refer to vegadhāraṇa.
Vibandha	Constipation.
Vidagdhabasti	Cystitis.
Vidāha	Burning sensation.
Vidanga	Embelia *ribes.*
Vidarika	Ipomoea *digitata.*
Vidhari	-do-
Vihāra	Activity, play.
Vijātīya tejassamyoga	Aerobic oxidation.
Vijṛmbhika	A clinical condition marked by excessive yawning.
Vilambika	Retention of food in the guts.
Vilayanarūpa	This term refers to the loosening and overflow of the morbific factors of the disease from their own sites.
Virecana	Causing purgation by the administration of drugs.
Visargavega-svayamāvasthāna	The natural abatement of such natural urges as defaecation etc.
Visarpa	A disease which resembles the clinical picture of erysepeles.

Viśada	—Transperancy.
Viṣamuṣṭi	—Nuxvomica.
Viṣapīḍā	—State of poisoning.
Viṣūcikā	—Acute gastro-enteritis (often confused with cholera).
Vṛddha	—Old, elderly, aged, senior.
Vṛddhavaidya	—Senior physician.
Vṛddhi	—Increase.
Vyādhibalavirodhitva	—An aspect of resistance to disease which is antagonistic to its strength and virulence.
Vyādhikṣāmatva	—Immunity, resistance to disease.
Vyādhimukti	—Termination of the disease.
Vyādhipratyanīka	—Treatment antogonistic to the disease.
Vyādhivṛddhi	—Extention of the disease.
Vyādhyutpādavibandhakatva	—An aspect of resistance to disease which is antagonitic to the cause of the disease.
Vyāna	—One of the five vayūs which is said to be located in the heart and course through out the body and regulate the circulation of fluid and sweating.
Vyanga	—Black patches in the face.
Vyāyāma prasakta	—Indulgence in physical exercise.
Vyāyāma	—Physical exercise.
Vyāyāmasevi	—Habituated to physical exercise.
Vyutpatti	—Etymology and definition.

Y

Yāna yātrā	—Travel by vehicles.
Yavaka	—Barley.
Yonidoṣa	—Gynaeaological diseases.
Yūṣā	—Gruel.
Yuktivyapasraya	—Rational therapy.

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A COMPARATIVE PHARMACOGNOSTIC STUDY OF COMMERCIAL SAMPLES OF THE 'VARUNA' BARK

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Introduction

The bark of *Crataeva nurvala* Ham., (*C. religiosa* Forst. var. *nurvala,*) family-Capparidaceae, commonly known as *'varuna'* is used in the indigenous system of medicine for various diseases, specially in a strangury and diseases of chest and blood. It is reported to be bitter, stomachic, laxative, vesicant, anthelmintic and detergent. The bark of the stem and root of this plant constitutes the principal medicine of the Āyurvedic pharmacopoeia, for calculous affections. It is said to promote the appetite, increase the secretion of the bile and remove disorders of the urinary organs. The plant is wild or cultivated, often found along streams, in the sub-Himalayan tracts and also found in Burma and tropical Africa. The plant is commonly met with in Madras Presidency, Bombay, Bengal and also in Uttar Pradesh (Kirtikar and Basu, 1933; Annonymous, 1950; King, 1922; Aiyer and Kolammal, 1966; Dymock *et al.*, 1889).

Another species of this genus, namely *C. roxburghii* R. Br. is also known as *'Varuna'* which is reported to be used in the indigenous system of medicine. Dey (1896) has mentioned that the market sample of *'varuna'* bark is believed to be that of *C. religiosa* var. *nurvala.* Aiyer and Kolammal (1966 and Prasad *et. al.*, (1966) have described the macroscopical and microscopical structures of *Crataeva nurvala* Ham. but without any reference to the commerical samples.

Apparently the commerical samples of *'varuna'* from various places are similar as can be seen from the common macroscopic and microscopic description. No pharmacognostic studies, however, have been done on commercial samples obtained from different places of the country. It was, therefore, decided to examine the commerical materials of 'varuna' from different places and to compare them with the genuine material.

Material and Methods

With a view to have a survey of *'Varuna'* bark available in the market, commercial samples from Banaras, Lucknow, Dehradun, Gorakhpur, Calcutta and Madras were procured from the respective local sources. The materials were studied macroscopically and microscopically. Besides, merely recording the above observations, an attempt was made to find out if the materials significantly differed from each other in these respects. Microchemical tests as described by Johansen (1940) were carried out on sections of the material after soaking them in water.

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MACROSCOPIC CHARACTERS

The bark in commercial sample occurs in flat or slightly curved pieces varying from 4.0 to 20.0 cm long and 3.0-10.0 cm wide. There is considerable variation in thickness within and among the samples from various places. The outer surface is ash coloured and rough due to the presence of numrous small and round lenticels and transverse wrinkles. The inner surface is comparatively smooth and whitish brown to buff coloured. Fracture is short and slightly splintery. In some cases, the outer surface is yellowish brown, smooth and the fracture is fibrous and inner surface is longitudinally striated. The main macroscopical characters of the various commercial samples are given in Table I.

MICROSCOPIC CHARACTERS

In the transverse section, the outermost portion of the drug consists of a wide cork, followed by phelloderm, which is mostly composed of stone cells. Rhytidoma formation takes places. The secondary phloem is a very wide zone possessing concentric strands of ceratenchyma, alternating with the strands of stone cells, a few fibres (which occur rarely), parenchyma, traversed by medullary rays. The rays run zigzag, while a few occasionally bifurcate or join with the neighouring rays. Stone cells show a great variation in their shape and size. Starch grains, prismatic crystals of calcium oxalate and oil globules are present abundantly. All data have been recorded in Table II. The dimensions of the different tissues in each material are enumerated in Table III.

Discussion

In order to complete this aspect of study, pharmacognostical study on '*varuna*' bark from different places of the country were taken up. The investigation included the commercial materials obtained from Banaras, Lucknow, Gorakhpur, Dehradun, Calcutta and Madras. The macroscopic examination of the crude drug samples revealed characteristic features of the drug from Banaras (The genuine sample) with which the material from Lucknow, Calcutta, Gorakhpur, tallied, but from which those from Dehradun differed slightly and those from Madras differed considerably. The latter material is quite distinct from the other samples.

The microscopic examination of the materials revealed differences between the commercial samples from the other places and the Madras sample. The latter sample did not have the cork sclerosed, strands of stone cells in the secondary phloem region and starch grains.

The size and shape of the stone cells differed in the various commercial materials, the Madras sample having the largest dimensions (600-900)μ while the Calcutta sample had the average dimension 120-250μ the other samples varying from 120-300μ. Besides the sizes, there are two types of stone cells, one possessing pits and the other having radiating canals in the other samples, while

TABLE 1

Distinguishing Macroscopical Structures of Commercial Varuna Bank

	Banaras	Lucknow	Dehradun	Gorakhpur	Calcutta	Madras
Bark	Occurs in flat or slightly curved pieces.	Occurs in flat or slightly curved pieces.	Occurs in flat or slightly curved pieces.	Occurs in flat pieces.	Occurs in flat pieces.	Occurs i flat or chanelled pieces.
Outer surface	As coloured and rough due to the presence of numerous small and round lenticels and transverse wrinkles.	Ash coloured rough due to the presence of numerous lenticels and transverse wrinkles.	Yellowish to Yelowish brown, rough due to the presence of numerous lenticels and transverse wrinkles.	Ash to brown coloured ; rough due to the presence of lenticels and transverse wrinkles.	Ash to brown coloured ; rough due to the presence of large lenticels and exposes the brown phelloderm	Yellowish, rough due to the presence of small lenticels and longitudinal wrinkles.
Inner surface	Smooth, whitish brown to buff coloured.	Smooth, whitish brown.	Smooth, white to yellow.	Smooth, yellowish to brown.	Comparatively smooth, brown.	Smooth, brown to buff coloured with longitudinal strictions.
Fracture	Short and slightly splintery.	Short and splintery.	Short and splintery.	Short and splintery.	Short and splintery.	Fibrous.
Odour	Indistinct.	Indistinct.	Indistinct.	Indistinct.	Indistinct.	Indistinct.
Size	6-15 cm long 3-10 cm wide.	5 to 10 cm. long 3-10 cm wide	8-12 cm long 8-8 cm wide.	8-0 to 20-0 cm long 3-8 cm wide	4 to 15 cm long 4 to 8 cm wide.	5-0-7-0 cm long 1-0-4-0 cm wide.
Thickness	5 to 12 mm	5 to 10 mm	8-15 mm	10-20 mm	6-12 mm	5 to 18 mm

TABLE 2

Distinguishing Microscopical characters of commercial Varuna Bark

	Banaras	Lucknow	Dehradun	Gorakhpur	Calcutta	Madras
Cork	Cells are sclerosed.	Cells are sclerosed.	Cells are not sclerosed.	Cells are sclerosed.	Cells are sclerosed.	Cells are not sclerosed and are reticulately thickened.
Phelloderm.	Composed of stone cells and parenchyma.	Composed of stone Cells and parenchyma.	Composed of stone cells and parenchyma.	Composed of stone cells and parenchyma.	Composed of stone cells and parenchyma.	Composed of mostly stone cells and a few parenchyma, which late gets converted into stone cells.
Rhytidoma	Present.	Present .	Present.	Present.	Present.	Absent.
Secondary phloem	Consits of sieve tubes, companion cells, phloem parenchyma, stone cells and a very few phloem fibres	Consists of sieve tubes, companion cells, phloem parenchyma, stone cells and a few fibres.	Consists of sieve tubes, companion cells, fibres and phloem parenchyma stone cells are present rarely.	Consists of sieve tubes, companion cells, phloem parenchyma and stone cells.	Consists of sieve tubes, companion cells, phloem parenchyma and stone cells and a few fibres.	Consists of sieve tubes, companion cells, phloem, prenchyma alternating with the bands of phloem fibres.
Ceratenchyma	Present	Present	Present	Present	Present	Absent
Phloem fibres	Very small	Very small and slightly thickened	Elongated with pointed tapering ends and slightly thickened.	Absent	Very minute	Elongated, highly thick walled lignified with their tapering ends chisel like or pointed.

Stone cells	Some are moderately thick walled, possess simple pits while others highly thickwalled with radiating canals and are circular, elliptical or rectangular.	Some are slightly thickwalled, possess simple pits while others are highly thicked walled with radiating canals and are circular elliptical or rectangular.	Some are slightly thickwalled, possess simple pits while others are highly thickwalled with radiating canals and are circular elliptical or rectangular.	Some are slightly thickwalled, possesss simple pits while others are highly thickwalled with radiating canals and are circular elliptical or rectangular.	Some are slightly thickwalled, possess simple pits, while others are with radiating canals and are circular, elliptical or rectangular.	All are highly thickwalled, elongated like a fibre with border like pitting due to curved aperture. —
Ray cells	Parenchymatous	Parenchymatous	Parenchymatous	Parenchymatous	Parenchymatous	Parenchymatous cells get converted into stone cells.
Starch grains	Present abundantly	Present abundantly	Absent	Present abundantly	Present abundantly	Absent
Prismatic crystals of calcium oxalate	Present	Present	Present	Absent	Present	Present —
Tannin	Absent	Absent	Present	Absent	Absent	Present

TABLE 3

Measurement of different tissues of the commercial 'Varuna' Bank (in microns)

	Banaras	Lucknow	Dehradun	Gorakhpur	Madras	Calcutta
Cork	10-25-30-40× 6-12-15-20	10-25-30× 5-8-10	38-50-63× 8-18-25	50-63× 18-25	20-30-45× 1-10-13	25-33-38× 8-10-20
Phelloderm	30-45-50-75× 15-31-24-30	20-33-38× 13-20-25	50-100-125× 25-38-45	30-50-70× 15-25-40	56-63-75× 15-25-38	33-50-63× 20-25-38
Ray cells	22-35-45-65× 12-18-22-30	20-25-30× 13-18-25	18-25× 8-18	20-40-60× 12-20-30	25-38-45× 15-25-33	13-18-25× 10-13-25
Stone cells	70-120-160-200×	50-180-250×	90-150-300×	13-75-100×88×	50-100-180×	—
(*a*) *Pitted type*	40-70-100×140	350×50-70-150-250	50-70-100	13-33-63-100	30-50-100	
(*b*) *Having canals*	120-200-300-380× 20-40-60-100	250-300× 20-40-80	120-150-200× 20-30-60	100-150-188-250 ×8-15-25-38	120-200-250× 20-30	400-600-900× 1050-30-40-60-80
Calcium oxalate crystals	12-18-25× 9-12-18	10-18-25× 8-15-25	15-40-× 13-25	—	13-25-28× 8-15-25	8-10-25× 8-10-25
Starch grains	3-7-10-16 in diam.	3-5 in diam. —	—	3-5-13×3-8-10	3-10-×3×8 in diam.	—
Fribres	120-250×3-5	113-225×3-8	600-750×10	—	180-250×10-20	800-900× 1100×10

the Madras sample has only one type of stone cells, which are pitted and elongated like a fibre.

Cork cells are mostly sclerosed, but in Madras sample the cells are reticulately thickened and in Dehradun sample, the cells are only suberized. The phelloderm is represented by a wide zone of tissue, but when *a new cork is formed it is scantly developed and medullary rays are see running upto the* cork. But in Madras sample, phelloderm cells are composed of Stone cells and parenchyma *only which latter get converted into stone* cells and no cork formation takes place in this region. The ray parenchyma also gets converted into stone cells in the Madras sample.

Fibres are rarely present in genuine sample as well as other commercial samples and are absent in Gorakhpur sample, but in Madras sample concentric bands of fibres are present, which are long, thick walled, lignified with their tapering ends chisel shapped or pointed.

The cell contents do not show any marked differences in the samples obtained from different places except the presence of tannin in Madras and Dehradun samples and absence of starch grains as well as tannin in Gorakhpur samples.

The macroscopic and microscopic differences indicate that the samples obtained in the crude drug market in Madras is different from the samples obtained from other places. It is, therefore, most likely that the botanical source of the Madras sample is *quite different from that of other samples.*

Summary

A comparative pharmacognostic study of *commercial samples of 'Varuna' bark obtained* from different places of the country was taken. The investigation included the commercial materials obtained from Banaras, Lucknow, Dehradun, Gorakhpur, Calcutta and Madras. The macro-and microscopic examination of the crude drug samples revealed characteristic features of the drug from Banaras, with which the material from Lucknow, Dehradun, Calcutta, Gorakhpur tallied but from which those from Madras differed considerably.

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PHARMACOGNOSTIC STUDY OF LEAF OF *NYCTANTHES ARBORTRISTIS* LINN. (*PĀRIJĀTA*)

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Introduction

The leaves of the drug *Pārijāta* are useful in fever and rheumatism. Decoction of leaves is recommended as a specific for obstinate sciatica. Expressed juice of leaves is cholagogue, laxative, mild bitter tonic and is given to children as a remedy for worms (Chopra, Nair and Chopra, 1956). *Vagbhata*, however, does not seem to mention this plant drug in his treatuse written about 300-400 A.D.

The drug *Pārijāta* has been equated with the plant *Nyctanthes arbortristis* Linn, belonging to the family Oleaceae. The position of the genus *Nyctanthes* has been under investigation for the past few years and it has now been decided to include the genus in the family verbenaceae on the basis of a number of morphological and anatomical characters as well as on the basis of known geographic distribution of the genus (Stant, 1952 and Moldenke, 1952). The genus has been under scrutiny by Das and Rao (1966) from the chemotaxonomical point of view. The plant is widely grown as an ornamental plant but is also found in wild state in forests along the Satpuda range.

Fotidar (1939) and Majumdar (1941) studied the stem of the plant from a botanical aspect and indicated the nature of the leaf trace, leaf gaps, and the abnormal swing of lateral bundles in the petiole while passing to the stem through the node. Rao (1947) described botanically the anatomy of the leaf making a special mention of sclerosed rod-like cells in the palisade tissue. Sen and Singh (1964) recorded B-amyrin, B-sitosterol, hentriacontane and benzoic acid in the leaf of *N. arbortristis* in addition to mannitol. Dutta and Mukherji (1952) have reported the microscopic characters of the leaf but have not described the petiole in details or the stomatal index and the vein islet number in the leaf as also the phytochemical findings. In view of such deficiencies the complete pharmacognostical work is reported here.

Materials and Methods

The leaf material was collected in the month of May from Poona for microscopic studies, which were done on hand sections as also on sections 15-18μ thickness which were cut on the microtome after the usual procedures of killing, fixing, dehydration etc. The extractives and ash were deter-

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mined in triplicate by the *standard* B.P. method (1963). Microchemical tests as described by Johansen (1940) were carried out on sections to the material after soaking them in water. The fluorescence tests were carried out according to Chase and Pratt (1949). Methods for determining the quantitative values were same as described by Wallis (1953). In addition, the usual phytochemical tests for alkaloids were also carried out. The percentage of total alkaloids was determined as given by Paech and Tracey (1955).

Results

MACROSCOPICAL CHARACTERS

The leaves are borne in pairs (Fig. 1). They are opposite and decussate on a quadrangular axis. They are 4-10 cm long and 2-6 cm broad, ovate, acute or acuminate very rough above and densely pubescent with appressed hairs below. They are entire or with a few large distant teeth, base rounded or slightly cuneate, main nerves 2 to 4, colourless above and conspicuous beneath. The intravenal portions are erupted making the leaf surface uneven particularly when the leaves become old. The petiole is short upto 1 cm with a distinct adaxial groove, and hairy. It is also slightly flexed on account of the bending and turning which enables the lamina to get fully exposed to the sunlight.

MICROSCOPICAL CHARACTERS

Petiole (*Figs. 2 and 3*) *:*

The petiole is covered all over with long unicellular hard and stiff hairs (Fig. 6). They are brittle and break on applying excessive pressure. Each hair arises from a slightly raised basal disc consisting of epidermal cells 19-28-38 μ × 19-24-30 μ arranged almost symmetrically round the base of the hair. Locked among these cells is the base of the hair from which the hair tapers gradually towards the tip. The tip is sharp and pointed. The base of the hair is 19-34-49μ broad and contains protoplasm while the remaining portion of the hair is apparently occupied by a long vacuole or cavity which does not show any contents. The wall of the hair is 2 to 5 μ thick and sometimes it is deposited with irregular deposits of silica all along the length which make the hair very rough. The length of the hair is 238-310-539 μ.

In a t.s. of petiole (Fig. 3) the epidermis is found to consist of more or less rectangular cells with convex outer walls which are heavily cuticularised.

The cuticle is present and extends over to the hairs. Toards the adaxial side the epidermal cells are isodiametrical their size being 11-18-27 (R) × 8-17-27 (T) × 19-31-49 μ (L) while towards the abaxial side they are 11-25-42 × 8-16-23 × 19-43-53 μ.

Towards the adaxial side the t.s. shows a notch corresponding to the groove, its depth depending upon whether the section has passed through the apical portion of the petiole or the basal portion. The notch also bears the same kind of epidermal hairs as the remaining epidermal surface.

A large crescent shaped main vascular strand, about 1000 μ long and 170 μ deep, occupies the central portion of the petiole while laterally in the elevated portions towards the adaxial side are situated 1 to 3 smaller vascular strands. All these strands have a normal orientation with the xylem situated towards the upper-adaxial-side, facing the groove. The xylem of the main strand consists of 50 to 68 rows of vessels arranged side by side with the protoxylem elements of each row lying towards the notch on the adaxial side and the larger metaxylem vessels towards the abaxial side of the petiole. Between the rows is xylem prenchyma. Each row towards the lateral extremities consists of 3 to 4 vessels while towards the central portion of the strand it consists of 8 to 10 vessels. The protoxylem elements are 8-13-19μ broad and 136-293-460μ long while the metaxylem elemets are 19-33-46 μ broad and 136-184-236 μ long. The end walls of the metaxylem element are slanted and have perforation.

All along the abaxial side of the xylem is cambium. Next to the cambium is a strip of phloem tissue supported by somewhat thick walled small celled tissue, corresponding to the bast but is not lignified.

The smaller accessory vascular strands towards the elevated sides of the notch are upto 100 μ long and 75 μ broad and are organised in the same manner as the main strand. The xylem however consists of 4 to 8 rows only. The protoxylem elements are 4-7-11μ broad and 30-64-118 μ long while the metaxylem elements are 8-13-15 μ broad and 34-57-118 μ long.

All the remaining portion of the petiole is occupied by the ground tissue. The cells in the peripheral region of the ground tissue are small, more or less collenchymatous and form the hypodermis. It is 8 to 10 layered on the abaxial side and also towards the notch and becomes narrower towards the elevated portions on the sides of the notch where it is 4 to 5 celled thick. These cells are 23-46-76 μ × 19-34-57 μ × 30-50-80 μ. The hypodermal cells very near the notch are smaller and are 11-20-27 μ × 8-14-23 μ × 23-39-49 μ. The remaining ground tissue cells are 25-56-80 μ × 19-44-65 μ × 27-58-95 μ. The innermost cells of the ground tissue surrounding the strands are somewhat smaller than the large celled tissue and prominently contain a large number of chloroplasts which stain dark with iodine and give a false appearance of a bundle sheath. Similarly a linear band of cells a few cells below the epidermis and commencing from the extreme accessory bundle in the elevated part on the side of the notch, prominently contain chloroplasts. The other cells of the ground tissue contain at the most a few chloroplasts in a cell.

Lamina (Figs. 4 and 5) :

The petiole continues into the lamina as the main vein and the structure of the main vein is therefore similar to that of the petiole. It is however observed that the adaxial groove which is fairly deep towards the basal portion of the lamina becomes shallow and ultimately flat towards the apex.

Both the surfaces of the lamina have the same type of unicellular long hairs as found on the petiole (Fig. 6). The basal disc consisting of 8 to 12 cells somewhat raised from the epidermis, is almost circular with a diameter of 50-55μ. The cells are narrowed towards the centre of the disc and are arranged side by side in a circle around base of the hair. The basal part of the hair is 19-30-46μ while the length of the hair is

101-185-296μ in those present on the upper epidermis while those present on the lower epidermis are 215-304-542μ long and 23-32-44μ broad at the base.

The lower epidermis possesses stomata 23-30-42μ×15-24-46μ. The stomatal index is 16.1-20.9-24.8 for the lower epidermis. The vein islets are very broad and the vein islet number is 0.96-1.48-2.10 per sq. mm.

T.S. of leaf (Fig. 5):

The upper epidermis consists of larger cells -- 27-42μ×15-24-46μ. The lower epidermis consists of smaller cells 11-21-30μ×11-15-19μ in which the outer wall is cuticularised and convex.

The mesophyll consists of chlorenchymatous tissue distinguished into palisade and spongy layers. Vascular bundles are located towards the centre of the lamina in the basal parts of the leaf while they are shifted towards the upper surface as one passes towards the apex. Towards the distal end of the lamina the small squarish cells below the palisade form only one layer while very near the apex they are absent altogether.

The spongy tissue consists of rows of cells surrounding large spaces towards the lower epidermis. They contain few chloroplasts. On either side of the mid-rib, a layer of non-chloroplastic cells intervenes between the epidermis and the palisade.

MICROCHEMICAL TESTS

Microchemical tests revealed the presence of starch associated with the chloroplasts particularly in the small-celled chloroplastic tissue surrounding the major vascular strand.

PHYTOCHEMICAL TESTS

The phytochemical tests for proteins, reducing sugars, tannins and saponins were carried out on water extract of the leaves while that for alkaloids was carried out on the alcohol extract. The results of these tests are given in Table 1.

TABLE 1

Phytochemical tests of Nyctanthes leaf

Item	N. arbortristis
Proteins	—ve
Reducing sugars	+ve
Tannins	+ve
Saponins	—ve
Alkaloids	
Mayers reagent	+ve
Tannic acid	+ve
Picric acid	+ve
Wagoers reagent	+ve
Dragendorffs reagent	+ve

It will be seen from the table given above that alkaloids are present in the leaf. The quantitative assay for alkaloids was also carried out which shows 0.181 percentage of alkaloids in the leaf. The reducing sugars are present. The material was sujbected to acid hydrolysis and it was found that there is hardly any change in the quantity of sugars before and after the hydrolysis.

EXTRACTIVES AND ASH

TABLE 2

Percentage extractives and ash in the leaf of N. arbortristis

Item	N. arbortristis
Ash total	11.32
Ash acid insoluble	5.58
Extractives	
Water	37.3
Alcohol	17.8
Solvent ether	3.8
Petroleum ether	1.65

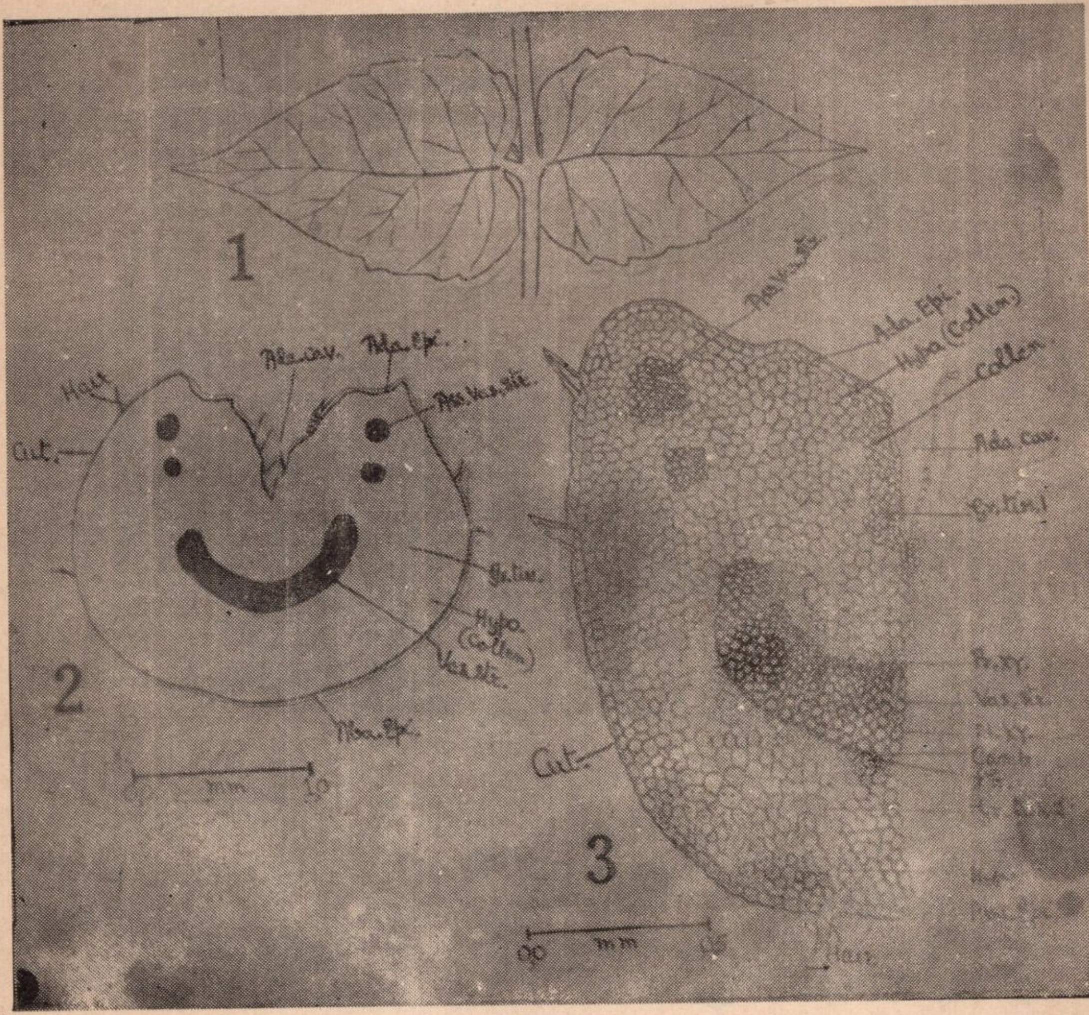

1
Hair
Cut.
Ada. cav.
Ada. Epi.
Ass. vas. str.
Gr. tiss.
Hypo. (Collen)
Vas. str.
Aba. Epi.
2
mm
10
Ass. vas. str.
Ada. Epi.
Hypo (Collen)
Collen.
Ada. cav.
Gr. tiss. 1
Pr. xy.
Vas. str.
Camb.
Cut.
3
mm
Hair

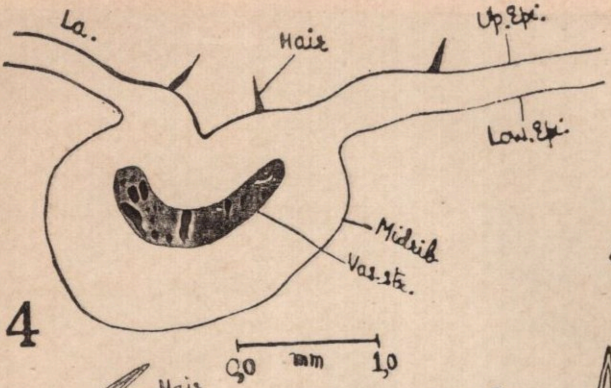
Plate 1

Fig. 1. Two entire leaves of *N. arbortristis* ×⅓ rd N.S.

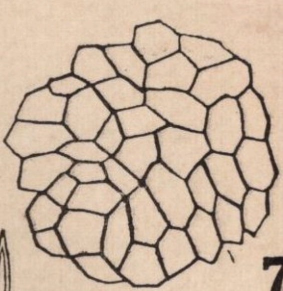
Fig. 2. T.S. of petiole of basal region (diagramatic)

Fig. 3. Left part of T.S. of Fig. 2 showing cellular details.

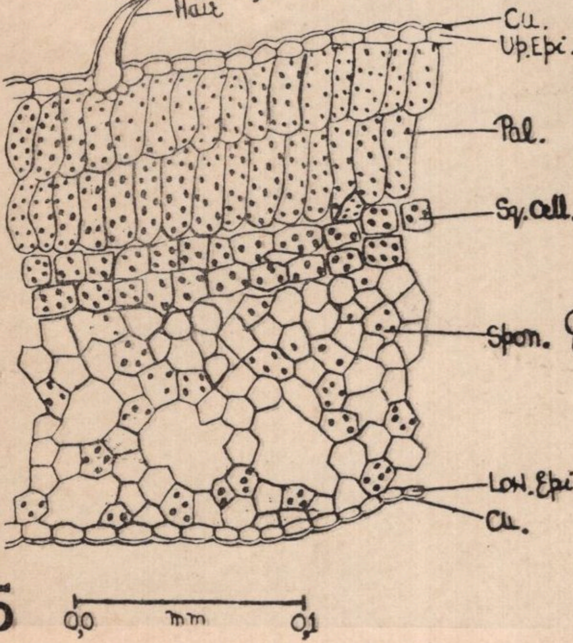
Ass. vas. str., Accessory vascular strand ;
Ada Epi., Adaxial epidermis ;
Hypo, Hypodermis ;
Ada cav., Adaxial cavity ;
Gr. tiss. 1, Small celled ground tissue ;
Pr. xy., Protoxylem ;
Vas. str., Main vascular strand ;
M. xy., Metaxylem ;
Camb., Cambium ;
Ph., Phloem ; Gr. tiss. 2, Ground tissue ;
Aba. Epi., Abaxial epidermis.
Cut., Cuticle., Collen., Collenchyma.


La.
Hair
Up. Epi.
Low. Epi.
Midrib
Vas. str.
0,0 mm 1,0

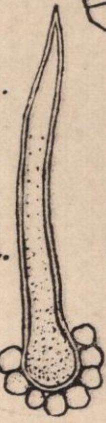
4



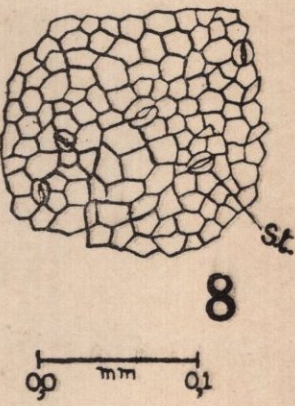
7


Hair
Cu.
Up. Epi.
Pal.
Sq. Cell.
Spon.
Low. Epi.
Cu.
0,0 mm 0,1

5



6



8

Plate 2

Fig. 4. Diagramatic transverse section of the leaf through midrib.
Fig. 5. Details of T.S. of lamina represented in Fig. 4.
Fig. 6. Hair
Fig. 7. Surface view of the upper epidermis.
Fig. 8. Surface view of the lower epidermis.

La, Lamina ; Cu, Cuticle ;
Up. epi., Upper epidermis ;
Pal., Palisade ; Sq. Cell, Squarish chloroplastic cells ;
Spon., Spongy parenchyma ;
Low. Epi., Lower epidermis ;
St., Stomata.

FLUORESCENCE TESTS

Fluorescence tests with all standard procedures under the ultraviolet light gave negative results with *Nyctanthes* leaf. There was no colour change in the powder with any of the procedures.

Summary

The macroscopic and microscopic findings of the leaf of *Nyctanthes arbortristis* Linn. are reported in this paper along with its microchemical and phytochemical tests, percentage extractives, ash and fluorescence since the leaf is used in Āyurveda. The significant finding is the presence of alkaloids which is being followed further.

ACKNOWLEDGEMENT

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PHARMACOGNOSTIC STUDY OF *SIRISHA ALBIZZIA* (*LEBBECK BENTH*) I. ROOT-BARK

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Introduction

'*Śirish*', one of the important ingradient of "*Salsaradi Gan*" of "*Suśruta*" is represented by three species viz. *Albizzia lebbeck*, *A. Procera*, and *A. odoratissima*. The first one is being black variety (*Krishṇa sirish*) and other two are white variety (*śwet śirish*) or white and yellow varieties (*śwet and peet śirish*) respectively, based on the colour of their barks (Sharma, 1956, Bhandari, 1945). Bark of all the three species is sold indiscriminately in the market.

A. lebbeck, a large tree, is distributed almost throughout India ascending upto 5000 ft. in the Himalayas (Hooker, 1879) and flowers in spring or summer. All the parts of this 'śirish' are credited with some medicinal properties ; and administered either individually or in combination with other drugs for therapeutic purposes and also recommended for the specific type of poisoning. The root is astringent, reputed to be used in hemicrania and ophthalmia and the powder of root bark to strengthen gums and tooth. An unguent prepared from root and other ingradient is used against leprosy, sinus and malignant ulcer in general. The bark is reported to be bitter, astringent, cooling, sedative, alexiteric, restorative, tonic, errhine, febrifuge and anthelmintic. It is an important ingradient with other drugs used against the disorders arising from provocation of the '*Vāta*' and '*Pitta*' humors and is curative of leprosy, leucoderma, ring worm, scabies, dermtosis, hiccup, bronchitis, violent asthma, epilepsy, insanity, consumption, scrofula. It is also administered in urinary diseases, colic abdomial dropsy, calculi, extreme aversion to food, indigestion, colitis, splenic disorder, haemorrhoides, in piles, carbuncles, abscesses, ulcers, syphilis, paralysis, deafness and in burning sensation of stomach and cracking of skin of a pregnant woman, relieves toothache, headache and restlessness of eyes. The leaves are given in eye diseases. Seeds in combination with other drugs used for destroying fleshy supper growth of ulcer, and fallig of polypus. It is also used as febrifuge, errhine, snuff and collyrium to cure dangerous eye diseaeses ; recommended in hemicrania, rhinitis, mania, epilepsy and leprosy. Flowers are aphrodisic, cooling, emolient, tonic to brain and used in hemicrania, gonorrhoea, leucoderma, tuberculous glands, skin diseases, hiccup and dyspnea (Anonymous, 1949 ; Anonymous' 1950 ; Anonymous, 1952 ; Kirtikar & Basu, 1933 ; Chopra *et al.*, 1956).

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Some chemical work on different parts of the plant has been reported (Farooq and Varshney, 1953 ; 1954 ; Varshney and Khan, 1961 ; Farooqui and Kaul, 1962 ; Barua and Raman, 1962 ; Gupta *et al.*, 1966 ; Chopra *et al.*, 1969), but no pharmacognostic study, except a little on stem bark (Aiyer *et al.*, 1957 ; Shah and Bhattacharya, 1960) seems to have been done. In view of the importance of this crude drug used in numerous diseases, the authors studied the plant for a detailed pharmacognostic investigation. The present communication, first of the series, deals with the same aspect of root bark.

Material and Methods

Fresh material was collected from the trees growing in National Botanic Gardens, Lucknow. Free hand sections of the young root and root bark at different stages of growth young to mature, were cut, stained and mounted in usual way. Maceration was done with the help of Schultz's fluid to study isolated elements. The cell-contents and cell-wall structures were studied according to Johansen (1940) and Kay (1938). Fluorescence characters exhibited by root-bark powder were noted as described by Chase and Pratt (1949). Physical constants were determined as given in I.P. (Anonymous, 1966).

Observations

MACROSCOPIC FEATURES—(Plate I. Fig. 1_a & $_b$)

The root-bark of '*Sirisha*' may be taken out from the plant in small as well as long pieces upto a length of even more than one ft. having breath upto 7.5 cm and generally not more than one cm in thickness. When dry, the pieces are either curved or even channeled. The outer surface (Fig. 1_a) is rough, spotted with large areas of brownish or greyish brown dead cork tissue which are wrinkled and separated by areas with cracks and lenticels where some of the cork tissue has peeled off. The outer bark peels off in the form of stratified papery flakes. The inner bark is fibrous, smooth and cream coloured. (Fig. 1*b*). The fracture is short, granular in the outer regions and fibrous in the inner region of the bark which has no perceptible odour and taste.

MICROSCOPIC FEATURES—(Plate II, Figs. 1-4)

A young root is more or less cylindrical, having somewhat, spherical out line in t.s. (Fig. 1). The epiblema consists of a single layer of thin-walled small cells, followed by 8-12 layered parenchymatous cortex, the cells of which are somewhat spherical. The endodermis is well defined, followed by a layer of thin walled cells forming the pericycle. The stele, in central portion, enclosing a small few celled parenchymatous pith in the centre, is tetrarch showing alternate groups of xylem and phloem elements.

Secondary growth starts in normal way producing secondary xylem towards inner side and secondary phloem towards outside. A characteristic feature of the phloem is the formation of phloem fibres intermixed with other phloem-elements even before the formation of cork cambium and cork. In later stages some cells in the outer region of secondary phloem start to be converted into stone cells which is in mature rootbark form a complete shell with some phloem fibres intermixed here and there round the phloem. Primary phloem is crushed.

The cork cambium is formed in the region of pericycle cutting off phellem towards outside and phelloderm towards inner side. The phellem cells, in younger stages, are of only one typerectangular and flat; while in later stages, when the lenticels are also developed, two types of cells are differentiated in some portions of outer phellem—one being rectangular flat and compactly arranged, the closing cells and other being somewhat spherical and loosely arranged the complimentary cells. These cells start to be formed in the region of lenticels in alternated bands of a few layers which result into the splitting of bark in papery flakes or sheets. In dry state the complimentary cells, in granular form, are blown away from in between the two sheets of closing cells.

Transverse-section of a mature root-bark (Fig. 2) may be differentiated into a broad zone of phellem, 8-12 layered phelloderm, outer phloem or band of stone cells an inner phloem, (Fig. 2_a). The phellem in some of its outer portions (Fig. 2_a) (where the papery sheets has been formed or are being formed) is composed of the two types of cells the closing cells (shown in Figs. as phel. 1) and complimentary cells ($phel_2$) as described above. The two types of cells are arranged in a few cell thick alternate bands. The inner part of the phellem, and also the outer portions, where no stratification has occured, consists of only one type of rectangular and flat cells (Fig. 2 a & b).

The phellogen is not clearly differentiated. The phelloderm is usually 8-12 layered, composed of thin-walled, somewhat radially elongated cells almost all filled with tanin. A few stone cells have also been observed sparsely distributed in this region (Fig. 2B). some cells possess prism-like crystals of calcium oxalate.

The outer phloem is represented by a band of stone cells (Fig. 2, 2c & d)—about 6-12 layers thick. In between the stones cells, some phloem fibres are also seen here and there, singly or in groups. The inner phloem (Fig. 2 D-E), in addition of phloem parenchyma and sieve elements, also shows groups of phloem fibres, crystal fibres here and there and ceratenchyma. Stone cells are also seen occasionally in outer region of the inner phloem (Fig. 2 D). This region also shows the presence of tannin in some parenchyma cells. Ceratenchyma and phloem fibres are very common and seen even in inner most portions. Sieve elements, phloem fibres and crystal fibres are clearly seen in t.l.s. (Fig. 3A & B). The medullary rays are uni-bi-or multiseriate and 8-30 cells high (Fig. 3A & B).

In macerated preparation and also in powder from the root-bark shows a large number of stone cells, phloem fibres and crystal fibres occasionally. In powder cork cells, phloem parenchyma and sieve elements may also be seen. The phloem fibres are quite long, simple, somewhat pointed at both the ends. The two walls are quite distinct and thick leaving a small lumen (Fig. 4 a & b). The crystal fibres are also tapering to both the ends, septate and uniseriate with crystals being very distinct (Fig. 4c). The walls of crystal fibres are not very thick.

Stone cells are quite thick walled and of variable shapes and sizes (Fig. 4-d-1).

Measurements (in microns) of various cells types

Cork (in t.s.)	
(*a*) Closing cells	12-*37*-61.5T×10-*16*-30R (T-tangentially
(*b*) Complimentary cells	20-*25*-32.8T×24-*30*-37R R-radially)
Stone cells (isolated)	24-*62*-102.5×16-*25*-37
Phloem fibres (isolated)	688-*1925*-2307×12-*15*-20.5
Crystal fibres (Isolated)	380-*656*-738×18-*24*.6

CHEMICAL TESTS

Presence of reducing sugar and saponine in the water and alcohol extract, as well as sterol in petroleum ether and alcohol extract could be detected.

FLUORESCENCE CHARACTERS

The powder of root-bark examined under ultraviolet light and the fluorescence characters are recorded in the table-1.

TABLE 1

Fluorescence characteristics of powdered root-bark of Albizzia lebbck benth

Treatment	Fluorescence
Powder as such	Ash colour
Powder mounted in nitro-cellulose	Ash colour
Powder treated with 1N, NaOH in methanol	Green
Powder treated with IN, NaOH in methanol and mounted in introcellulose	Bluish green

PHYSICAL CONSTANTS

Total ash, acid insoluble ash and water- and alcohol soluble extractives of the root-bark powder were determined. The findings are tabulated in the table—2.

TABLE 2

Determination of Physical constants

	Percentage of value (average of three determinations)
Total ash	5.025
Acid insoluble ash	0.77
Water soluble extractive	10.52
Alcohol soluble extractive	13.17

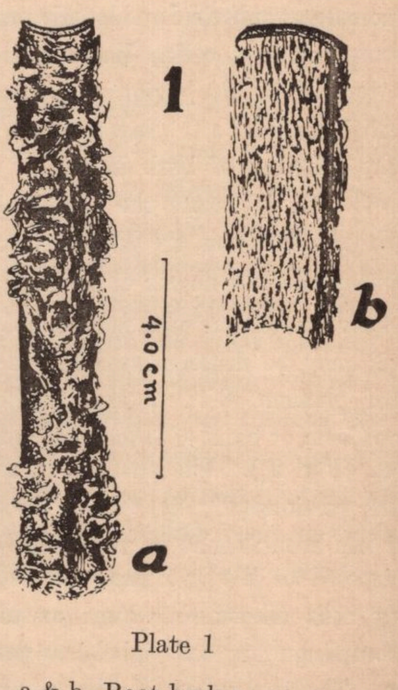

Plate 1

Fig. 1. a & b. Root-baık as seen externally.
a. showing outer surface ;
b. showing inner surface.

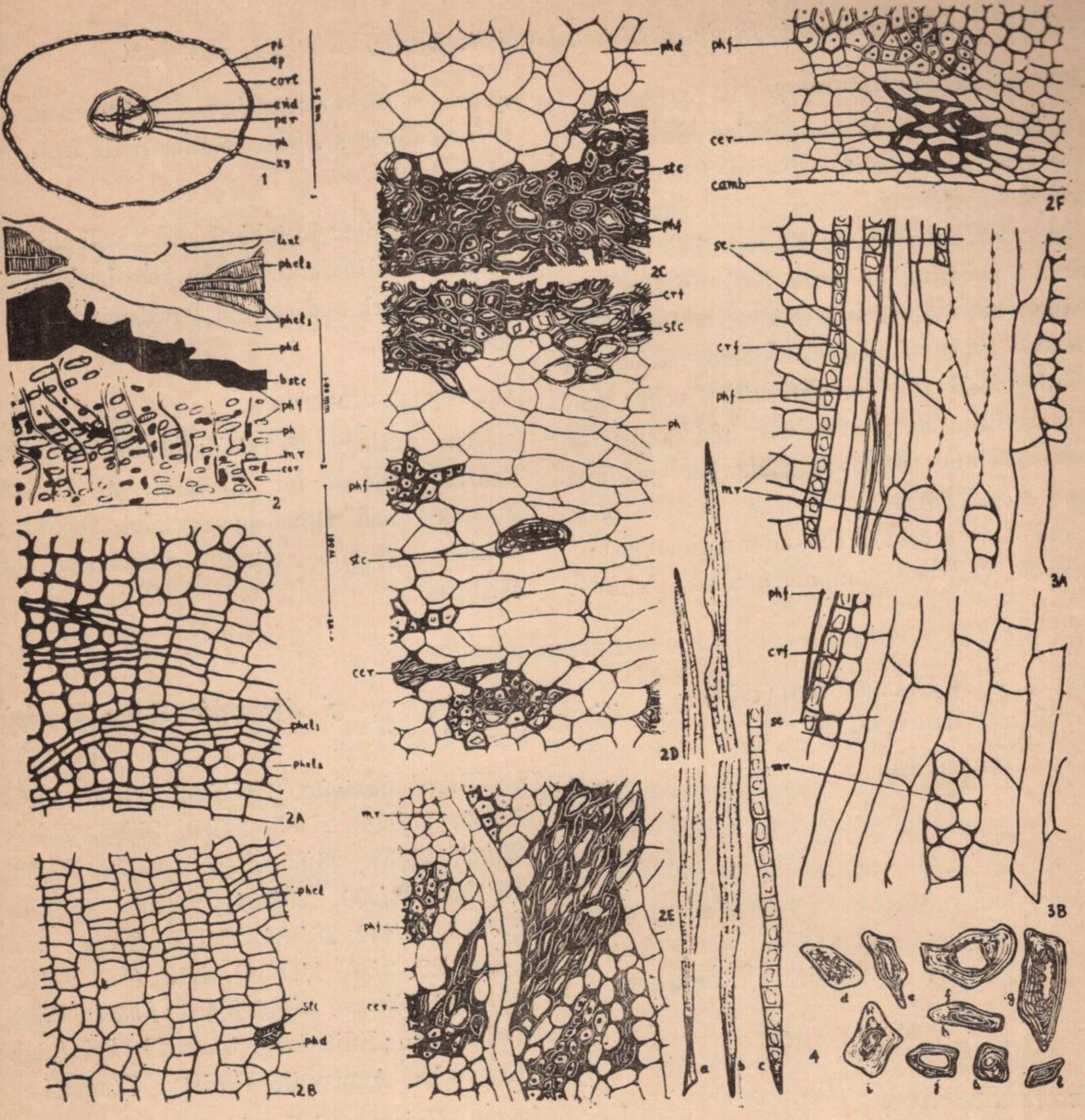
ph
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Plate II

Fig. 1. Diagrammatic representation of t.s. of a young root.

Fig. 2. Diagrammatic representation of t.s. of mature root-bark.

Fig. 2 A-F. showing cellular details of root-bark in t.s.

2A. outer periderm showing closing cells (phel$_1$) and complimentary cells (phel$_2$);

2B. inner periderm showing inner part of phellem and phellederm;

2C. showing inner phelloderm and outer part of phloem, i.e., band of stone cells;

2D. showing inner layers of stone cells and outer portion of inner phloem;

2E. showing innermost part of phloem;

Fig. 3A & B. portions of t.l.s. of root bark showing phloem fibres, crystal fibres, sieve elements and medullary rays.

Fig. 4. showing isolated elements;

a & b. phloem fibres;

c. part of crystal fibres;

d-1. stone cells

bstc, band of stone cells; camb, cambium; cer, ceratenchyama; cort, cortex; crf, crystal fibre; end, endodermis; ep, epiblema; lent, lenticel; mn, medullry rays,; per, pericycle; ph, phloem; phd, phelloderm; phel, phellom; phel$_1$, closing cells; phel$_2$, complimentary cells; phf, phloem fibre; pi, pith; sc, sieve elements; stc, stone cell; xy, xylem.

Discussion and Summary

The present communication deals with the pharmacognostic study of root bark of '*sirisha*' (*Albizzia lebbeck*). It has been observed that its very characteristic feature is the splitting of outer bark tissue into papery sheets, which is due to the formation of two types of cells in alternate bands-the closing and the complimentary cells; the former being flat, rectangular and compactly arranged and the latter somewhat spherical and loosely arranged. The presence of a band of stone cells in the outer region most of phloem, very common phloem fibres, common occurence of cerantenchyma and occasional crystal fibres are the characteristic features of the bark.

Observations in table 1 and 2 will also be helpful to differentiate the root-bark from the stem bark and as well as checking of the adulterants.

ACKNOWLEDGEMENTS

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PHARMACOGNOSTIC STUDY OF BALIOSPERMUM MONTANUM MUELL–ARG.

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[Received for publication on September 19, 1970]

Introduction

Baliospermum montanum Muell Arg. (Euphorbiaceae) is known as *'Danti'* or *'Dantimul'* or *'Jamalgota'*. It is distributed throughout the sub-Himalayan tract from Kashmir to Khasi Hills and is common in North and East Bengal. It also occurs in Chittagong, Chota Nagpur, South India, Burma and Malaya.

The root is pungent, purgative, anthelmintic, diuretic, useful in pains, diseases of the skin and of the abdomen, piles, enlarged spleen, anaemia, leucoderma and jaundice (Kirtikar and Basu, 1933).

The seeds are drastic purgative and in over doses they are highly poisonous (Wealth of India, 1948). The root is also used in drospy. The oil of the seed is powerful hydragogue cathertic and used for external application in rheumatism. The decoction of the leaves is said to be useful in asthma. (Chopra *et al.*, 1956). All the parts of the plant and especially the roots are popularly used in Ayurvedic medicine in above diseases as well as in inflammation and jaundice (Nighantu Adarsh, Uttarardh, 1965), Bhavaprakash Nighantu 1969). From the root, wax, β-sitosterol and a triterpene acid have been isolated (Seshadri).

Uptill now no pharmacognostic work has been reported so the present investigation including estimation of flavonoids and T.L.C. pattern of flavonoids and triterpenes is carried out.

Material was supplied by Shri A. C. Dey, Survey Officer of I.C.M.R. and the usual methods for the investigations were followed. The drug consists of the root, stem and leaves of the *B. montanum*, (Plate 1, Figs. A, B, and C and Plate 3, Fig. 3).

MORPHOLOGY

STEM

Young stem is green while old one is greenish brown to brown. Surface is glabrous having small round or oval lenticels. Nodes are very close at the base but quite apart towards the apex. (Plate 1, Fig. A). Young stem is spirally twisted and slightly angular. Fracture is fibrous except in pith which covers 2/3 to 1/2 of the diameter and is many times hollow. (Plate 2, Fig. 2). Odour of the drug is none and taste is slightly astringent.

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LEAVES

Leaves are thin, penninerved, glaborous, except in some, lower surface is slightly pubescent. Apex. is acute. Upper young leaves are small, lanceolate and serrate, while lower ones reach upto 15 to 30 cm in length and 10 to 20 cm in breadth. They are oblong lanceolate, sinuate toothed. Base is rounded, 2-glandular. Petiole is 5 to 10 cm long, hairy, and has groove on the upper surface (Plate 3, Fig. 3).

ROOT

Roots consist mostly of root stock and very few real roots.

ROOT STOCK

Closely resembles the root in appearance and not thicker than root. Surface is rough having distinct nodes and bud in the axil of the scale leaf. Many rootlets are coming out from the surface (Plate 1, Fig. B). Transversely smoothed surface shows distinct but small pith in the centre; while most of the tissue is composed of xylem. Bark is very thin (Plate 4, Fig. 4). Root surface is longitudinally striated having big transversely elongated lenticels (Plate 1, Fig. C.) Central part is composed of solid core of xylem. Bark is very thin.

MICROSCOPY

STEM

It is a characteristic dicot stem.

Young stem

In the young stem, the epidermal cells protected by cuticle are squarish to rectangular and measure T-15-18-27μ, L-24-36-51μ and R-15-18-22μ. Hypodermis of a single layer follows the epidermis and is composed of bigger cells than those of epidermis. They measure T-21-28-40μ and R-17-23-33μ. Outer cortex is collenchymatous, 5-7 layered either in a continous zone or in groups at intervals, while inner one is parenchymatous (Plate 2, Figs. 2, 2*a*).

Old stem

In the old stem, cork either suberised or lignified consists of 4-10 layers. Epidermis is still persistent in old stem above the cork except at lenticels, where the epidermis ruptures. Hypodermis is absent here. Outer cortex 3-4 layered is collenchymatous, the cells are flattened tangentially. Inner cortex is parenchymatous. Very few cortical fibres of the type of pericycle are present. Nearly circular or slightly flattened nonlignified to lignified striated fibres are present in Pericycle either ioslated or in a group. Phloem moderately big zone consists of sieve tissue and phloem parenchyma. Medullary rays are traceable in some cases are generally uniseriate. Very few phloem fibres embedded in the above tissue are of the above type. (Plate 2, Fig. 2*b*).

All the fibres mentioned above are very long, striated, having small lumen, sometimes branched, some having oblique pits, while others without pits, measure L-570-937-1290μ and B-10-10-27μ (Plate 2, Fig. 2*c*). Cambium is indistinct. Xylem consists of vessels, tracheids, fibres, and xy. parenchyma. Vessels are few mostly arranged in a radial rows, have simple pits or bordered Pits and measures

L-414-607-820μ and B-43-72-108μ. Tracheids are very few, have simple Pits, and measure L-420-654-870μ and B-16-30-40μ (Plate 2, Fig. 2*c*). Fibres are of septate type, thick-walled, with big lumen and measure 11-20-34μ in breadth. Some of them have oblique Pits while some are without Pits. Some fibres show very close thin, transverse marking or septa. (Plate 2, Fig. 2*d*). Medullary rays mostly uniseriate, uncommonly biseriate are pitted, whole xylem is lignified. Pith is composed of round lignified, pitted cells, measure 41-75-112-μ in diameter.

Crystals of Calcium oxalate in large amount are present throughout the section except xylem. Most of them are clusters, though rarely rosettes and Prisms are present. Clusters measure 22-39-55μ in diameter. Brown coloured pigment is present throughout the section, more in bark and negligible in xylem. Starch grains, round or oval measure 4-8-13μ in diameter.

LEAF

Petiole

Petiole is completely indentical to stem, 12-15-vascular, bundles are arranged in a circle.

Leaf

Leaf is dorsiventral. Mid-rib projects more on the lower side (Plate 3, Fig. 3i). Few rows of collenchyma are present below the upper and lower epidermis. The cells of the epidermis are squarish to rectangular. The steler region is in the form of double crescent. The lower crescent is bigger and more deeper than the upper one. Sieve tissue is quite distinct. Pericyclic fibres either isolated or in a group are non-lignified to slightly lignified and accompaning both the crescents. Cork formation often found in mid-rib and sometimes in lamina portion, is an anomalous character of the leaf. Calcium oxalate mostly of cluster type are present quite abundantly in parenchymatous tissue, though it is found in collenchyma as well. Rarely prisms and rosettes also occur. Brown coloured pigment is found throughout. Trichomes are present more on the lower surface than on upper one and are unicellular, conical, thickwalled lignified with slightly striated cuticle. (Plate 3, Figs. 3, 3*a*, 3*b*).

Lamina

(Fig. 3*c*), One layer of palisade is present below the upper epidermis. Upper epidermal cells are slightly bigger than those of lower epidermis. Cluster crystals of calcium oxalate are distributed throughout the mesophyll. They are of two types, bigger ones are evenly distributed amongst the smaller ones. Bigger clusters measure 34-45-58μ in diameter while smaller ones measure 15-25μ in diameter. Trichomes are slightly less on upper surface are 180-240-367μ long and 20-27-37μ broad at the base; while those on lower surface are 127-225-315μ long and 17-26-35-μ broad at the base. Stomata are of Rubiaceous type. Sometimes collapsed or half-collapsed stomata are also found. (Plate 3, Fig. 3*d*).

Stomatal Index of upper epidermis is 1-6.
Stomatal Index of lower epidermis is 10-13.
Vein is let No. is 10-21.
Palisade ratio is 9-11.

ROOT

Root Stock

It closely resembles the stem. Cork suberised or lignified consists of 5-15 layers of cells, measure T. 37-55μ and R-16-26μ. Brown Pigment is present in the above tissue. Epidermis present in the stem is absent here. Outer 2-3 layers of cortex are sometimes collenchymatous and flattened while other layers are parenchymatous, and slightly tangentially elongated. Plenty of cortical fibres of the same type as those of stem are present. Phloem is narrow, consists of sieve tissue and phloem parenchyma. Uniseriate medullary rays are many times distinct. Very few fibres similar to cortex type are present here. Xylem consists of vessels, fibres and xylem parenchyma of the type as those of stem. Medullary rays mostly uniseriate, very rarely biseriate are pitted. Tracheids are generally absent. Whole xylem is lignified. Pith resembles to that of stem. Crystals are present throughout the section except xylem and are similar to those in stem. Brown coloured Pigment is distributed as in stem. Starch is present throughout the section but maximum in medullary rays and Pith while less in outer tissue (Plate 4, Fig. 4, 4*a*).

Root

Root closely resembles to root stock. Cork is composed of 4-12- layers of cells suberised or lignified and measure T-46-76μ and R-15-26μ. Phelloderm is quite big consists of outer 2-3 layers of flattened collenchyma followed by a parenchymatous zone. Large number of fibres are present similar to those of root stock. Phloem fibres are visible. They resemble to those of Phelloderm. Xylem consists of vessels, fibres and xylem parenchyma of the same type as those of root stock. Medullary rays are uniseriate or rarely biseriate. Crystals are similar to those from root stock, absent in xylem. Brown pigment present in the cork but less in phelloderm and phloem. The fibres deposited with pigment found in stem are quite uncommon in root. Starch is present throughout the section as in root stock and measure 5-15μ in diameter, (Plate 4, Figs. 4, 4*a*).

TABLE 1

Determination of Extractive Constants

EXTRACTIVE CONSTANTS

Ash Value	...12.5 to 13.0%
Acid Insoluble Ash	... 0.85%
Water soluble extractive	... 9.36%
Alcohol (70 %) soluble extractive	... 9.12%

TABLE 2

FLUORESCENCE ANALYSIS

10% of the filtered extracts after macerating the drug for 24 hours were observed under U. V. light.

Solvent		*Colour*
Acetone	...	Scarlet Red.
Benzene	...	,, ,,
Carbontetrachloride	...	,, ,,
Chloroform	...	,, ,,
Ethanol	...	Pink.
Ether	...	Scarlet Red.
Ethyl Acetate	...	,, ,,
Light Petroleum	...	,, ,,
Methanol	...	Pink.
Water	...	Milky Green.

FLAVONOIDS

Flavonoids are present in the leaf but absent in the root and stem. The test is carried out according to Luckner (1966*a*). The dry methanolic extract of the drug is treated with Boric acid Oxalic acid reagent and the residue left after evaporation is extracted with ether, which when seen in U. V. light shows yellowish green fluorescence.

The total quantity of the flavonoid present in the leaf is estimated according to Luckner (1966*b*) taking Rutin as standard, and the optical densities were determined at 420 m/μ on spectronic 20. The methanolic extract of the drug is treated with carbon tetrachloride and water. The upper methanolic solution is treated with acetic acid, pyridine water mixture and aluminium chloride; and the optical density is measured at 420 mμ. Different dilutions of the pure Rutin are prepared and the optical densities are measured similarly. From the standard calibration curve which is prepared by plotting concentration against optical densities, the concentration of the flavonoid present in the drug is found out, which is one percent. (side curve).

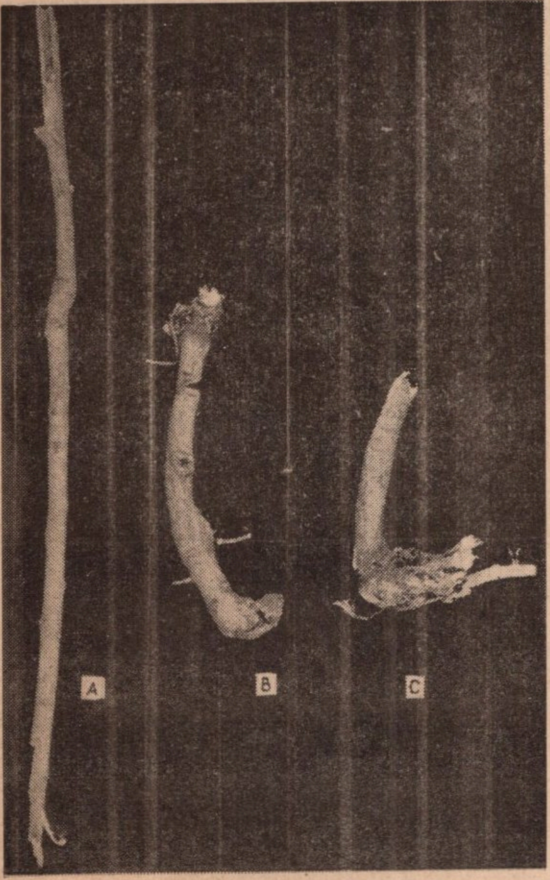

Plate 1

Fig. A, B, C—Drugs. × ½. (Fig. reduced to 0.5 times).

The thin layer chromatographic study is carried out according to Luckner (1966*c*) on Silica Gel G, with a solvent system consisting of Ethyl acetate ; Formic acid : Water (80 . 10 : 10) and spraying a mixture of Boric acid (3%), Oxalic acid (10 %) solution, (3 : 1). The chromatogram is heated to 120° for 15 minutes and inspected in U. V. light, it shows six spots, indicating there are six different flavonoids present in the drug. Out of these one corresponds to Rutin put as a reference substance. Further work is in progress. (chart-2).

TRITERPENES

Triterpenes are found to be present in the root, stem and leaf. Dry petroleum ether extract of the drug is extracted with chloroform and Liebermann-Burchard test is performed. Violet or pink colour in the test showed presence of triterpenes (Bhattacharjee and Das, 1969). T. L. C. for triterpenes is carried out according to Stahl (1965) on Silica Gel G, with a solvent system consisting of Benzene and Methylene chloride (50 : 50) and spraying a mixture of chlorosulphonic acid ; Glacial acetic acid (5 : 10). After heating to 130° for 5 minutes it shows two spots indicating two triterpenes are present. (Chart-1).

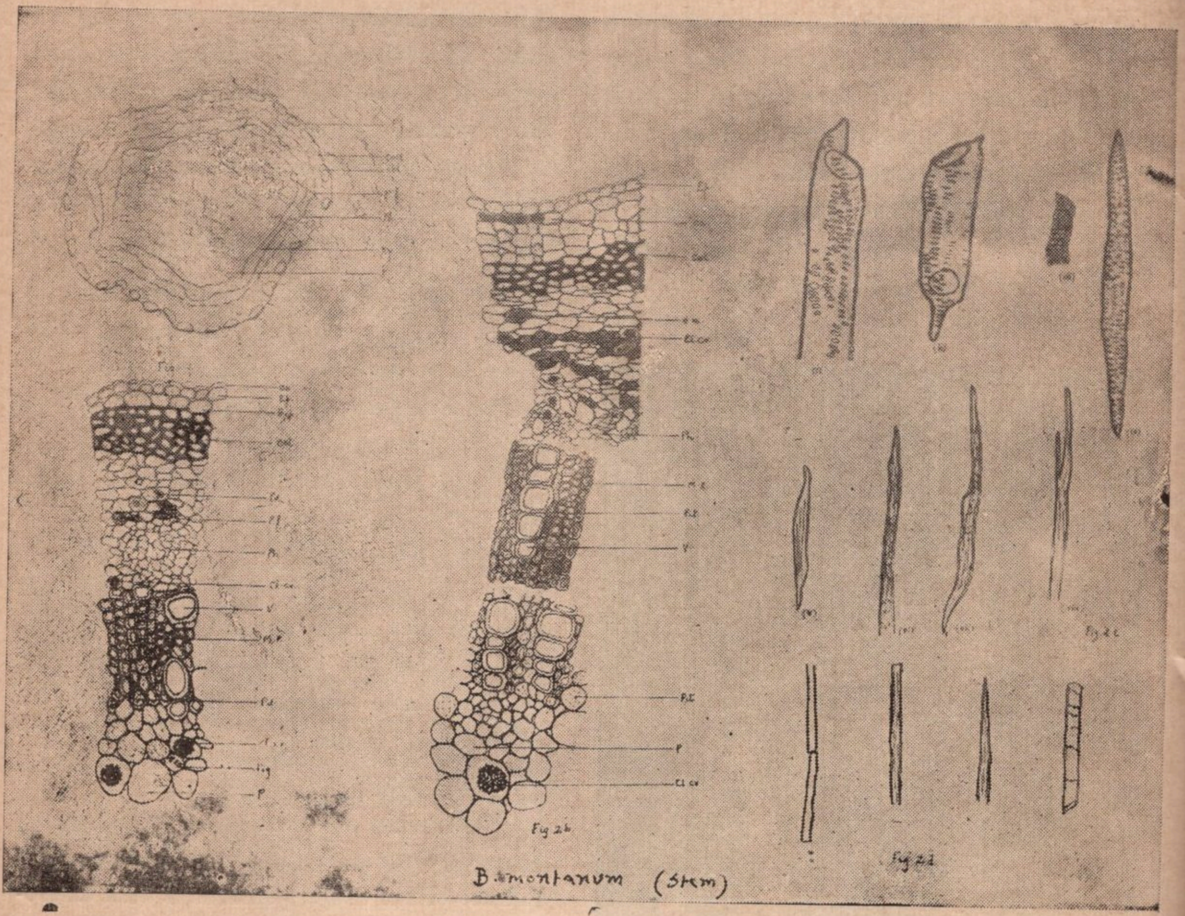

Plate 2

Baliospermum montanum (*STEM*) :

Fig. 2. Diagrammatic section × 15.

Fig. 2. (*a*) T.S. of young stem × 120.

Fig. 2. (*b*) T.S. of old stem × 120.

Fig. 2. (*c*) (i), (ii), (iii) Vessels and piece of vessel of Stem × 120. (iv) Tracheid of stem × 120. (v), (vi), (vii), (viii) fibres of bark of stem × 120.

Fig. 2. (*d*) Fibres of Xylem of stem × 120.

Ck-Cork ; Cl. Cr.-Cluster crystal ; c.m.-colouring matter ; Col.-Collenchyma ; Cort. Cortex ; Cu-cuticle ; Ep-Epidermis ; Hyp-Hypodermis ; M.R.-Medullry rays ; P-pith ; p. f. pericyclic fibre ; Ph-Phloem ; Pig-Pigment ; pit-pits ; pr-prism ; v-vessel ; xy-Xylem.

Summary

Detailed pharmacognostic study including pharmacopoeal standards like ash and extractive constats and fluorescence analysis of stem, leaf and root is carried out. Also in the leaf the presence of flavonoids, their T.L.C., pattern and total estimation compared as Rutin as standard is reported. The T.L.C. pattern of triterpenes is shown.

ACKNOWLEDGEMENT

Our thanks are due to the Central Council for Research in Indian Medicine and Homoeopathy for its help and assistance in carrying out the work.

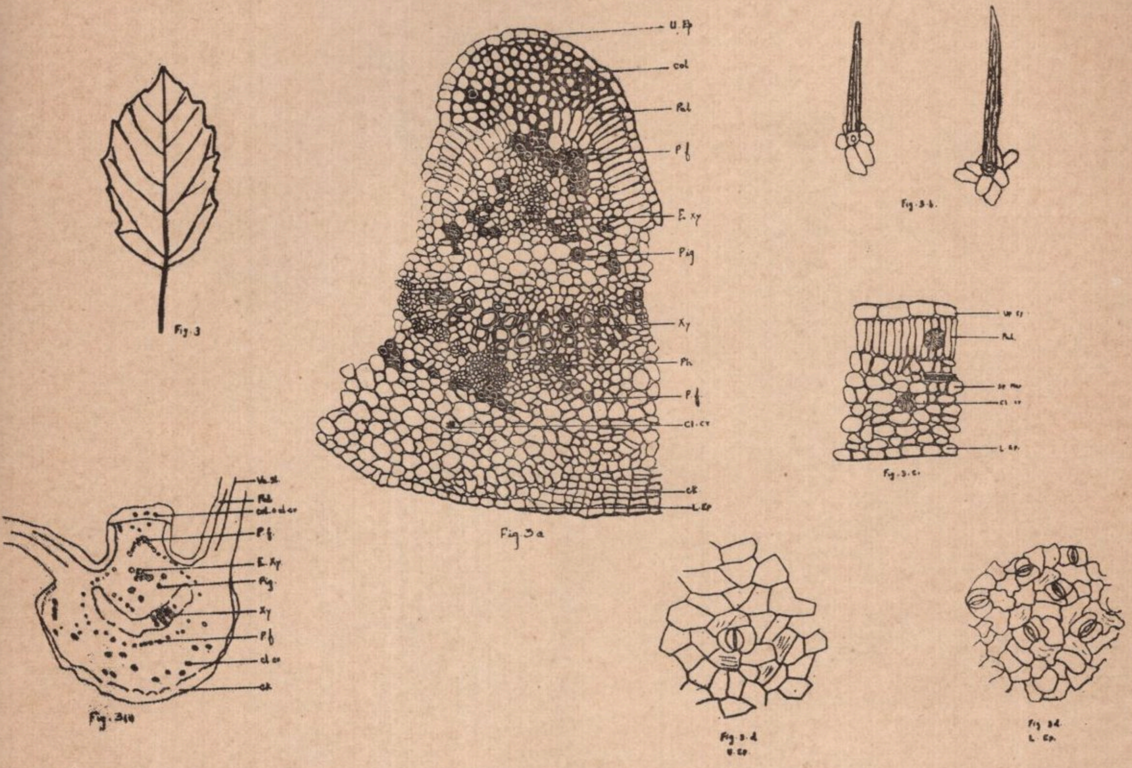
Fig. 3
U.Ep
col
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Fig. 3a
Fig. 3.b.
Up Ep
Pal
Sp Mes
Cl cr
L Ep.
Fig. 3.c.
Va. St.
Pal
col.
P.f.
E. Xy.
Pig.
Xy
P.f
cl cr
ck
Fig. 3(i)
Fig 3.d
U Ep
Fig 3d
L. Ep.

B. montanum (leaf)

Plate 3

Baliospermum montanum (*LEAF*) :

Fig. 3. Whole leaf × 0.35.

Fig. 3. (i) Diagrammatic section of leaf × 25.

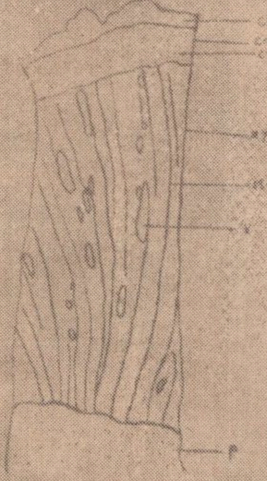
Fig. 3. (*a*) T.S. of Leaf through mid-rib × 120

Fig. 3. (*b*) Trichomes of leaf × 120.

Fig. 3. (*c*) T.S. of leaf through lamina × 120.

Fig. 3. (*d*) Epidermis lower and upper × 120.

Ck-cork ; Cl cr.-Cluster crystal ; Col.-Collenchyma ; E.xy-Extra Xylem ; L. Ep.-Lower epidermis ; Pal-Palisade ; Ph.-Phloem ; P. f.-pericyclic fibre ; Pig-Pigment ; Sp. Mes.-Spongy mesocarp ; U.P.-Upper epidermis ; Va. St-Vascular strand ; Xy-Xylem.


Ck
Cort & Ph
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M.R.
V
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Fig 4

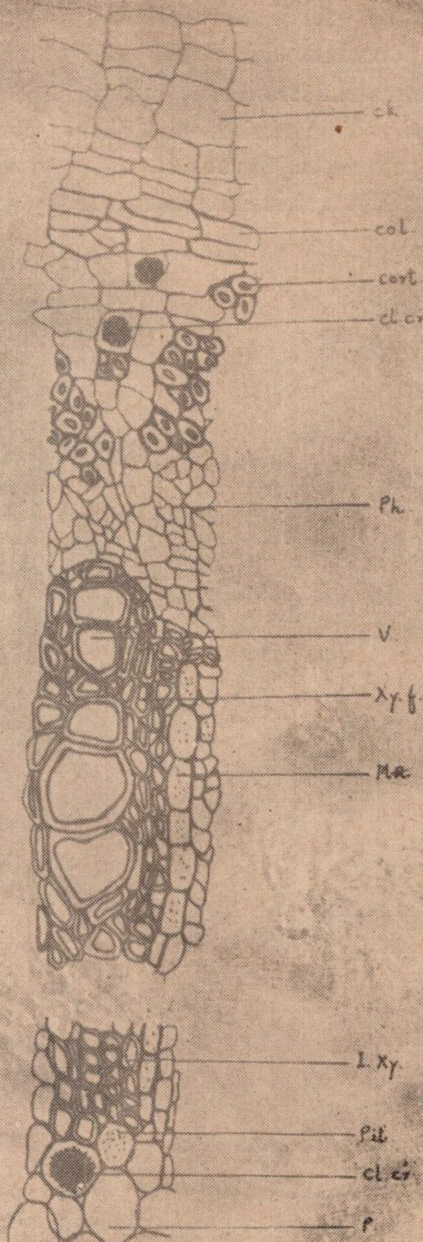
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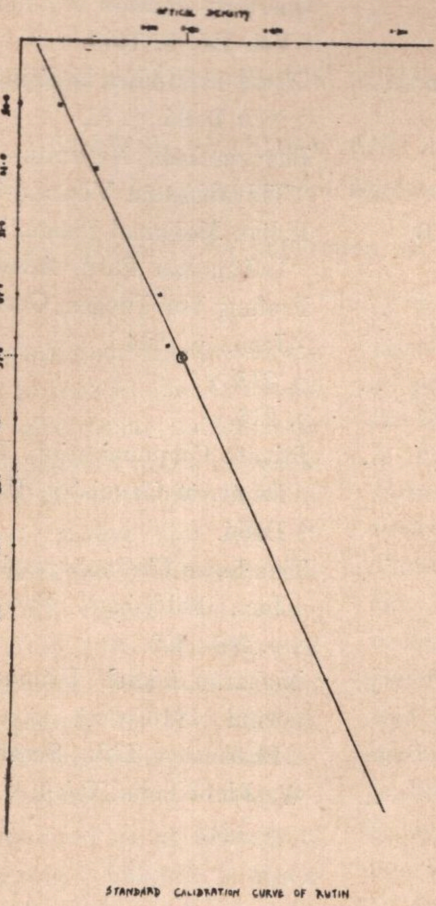
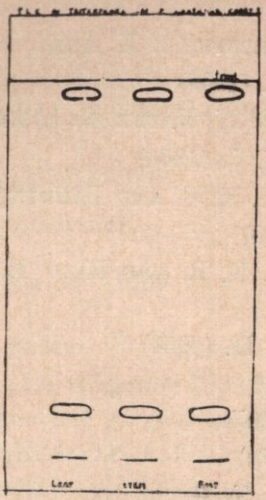
Fig 4a

B. montanum (root-stock)




Front
LEAF
STEM
ROOT

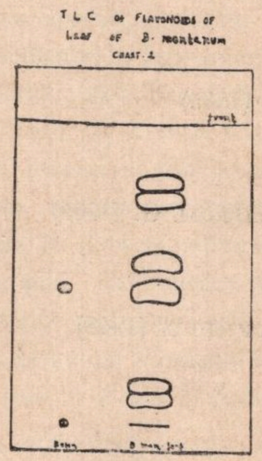

T L C OF FLAVONOIDS OF
LEAF OF B. MONTANUM
CHART. 1
Front
Rutin
B mon. leaf

Plate 5

Std. calibration curve of Rutin.
Charts 1 and 2 of T.L.C.

Plate 4 (refer p. 206)

Baliospermum Montanum. (ROOT-STOCK):

Fig. 4. Diagrammatic section of Root Stock X 120.

Fig. 4. (*a*) T.S. of Root Stock × 120.

Ck-Cork; Col.-Collenchyma; Cl. Cr.-Cluster Crystal; Cort.-Cortex; Cort. f.-Cortical fibre; I. Xy.-Inner Xylem; M.R.-Medullary rays; P.-Pith; Ph-Phloem; Pit-Pits; Ro-Rosettes; V.-Vessel; Xy-Xylem; Xy.f.-Xylem fibre.

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A LICHEN CRUDE DRUG (*CHHARILA*) FROM INDIA

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Introduction

Chharila is a lichen crude drug sold in the Indian bazar and is used in the Ayurvedic and Unani systems of medicine. In literature three lichens are mentioned under the name *chharila* as in general use as medicine in India. These are *Parmelia perlata* (L.) Ach., *P. perforata* (Wulf.) Ach. and *P. Kamtschadalis* (Mont.) (now known under the name *P. cirrhata* Fr.) (Watt, 1890 ; Kirtikar and Basu, 1935 ; Nadkarni, 1954 and Chopra *et al.*, 1956). Accodirng to Watt (1890), *P. kamtschadalis* has been known to Mohemmadan writers for centuries and in *Makhzan-ul-Adwiya* it is described as an astringent, resolvent and asperient. *Chharila* is also a carminative and aphrodisiac and has been considered to be useful in dyspepsia, spermatorrhoea, amonorrhoea, calculi, diseases of blood and heart, stomach disorders, enlarged spleen, bronchitis, bleeding piles, scabies, leprosy, excessive salivation, soreness of throat, tooth-ache, and pain in general. The smoke of *chharila* is believed to relieve headache. The powered drug is applied to wounds besides being a good cephalic snuff. (See the works cited above).

P. perlata, *P. perforata* and *P. cirrhata* occur in the temperate Himalayas and Assam. *P. perlata* and *P. cirrhata* are also found in the Nilgiri and the Pallini hills of South India. A detailed phytochemical study of the *Parmelia* species, including the above, has been conducted by Aghormurthy *et al.*, (1954), Rangaswami and Rao (1955) and Lal and Rao (1956). *P. perlata* has been found to contain atranorin and lecanolric acid ; *P. perforata*, azeorin, atranorin and lecanoric acid and *P. cirrhata*, atranorin and protolichestric acid. Information on the chemical constituents and medicinal uses of Indian lichens, including *Parmelia,* is also contained in a review in *Wealth of India* (Anon., 1962).

The crude drug samples examined by us from various sources contain *P. cirrhata* and *P. perforata*, but not *P. perlata.* The first two species comprise about 50 per cent of the bulk of the drug and the rest is made up of other lichens. A pharmacognostic account of the species comprising *chharila* is not yet available. We are therefore giving here a detailed description of the three species, *P. perlata*, *P. perforata*, and *P. cirrhata* based on the material collected by

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Ajay Singh from the Himalayas and that found in the bazar samples of *chharila*. We are also describing the distinguishing characters of the species we have found in the bazar samples of the drug. The latter appear to be adulterants.

PARMELIA PERLATA (FIGS. 1, 4-5)

Thallus pale greenish or brownish grey, foliose, crumpled, labate, dorsiventral ; up to 20 cm in diameter ; orbicular to irregular in outline, and loosely adnate to the substratum. Surface smooth, maculate, marked with minute, whitish cracks or a network of the same. Lobes imbricately arranged, ascending (up to 1 cm), short, rounded, 0.5 to 2 cm broad ; margins crenate, profusely covered with turgid, rounded to oblong sorelia (fig. 5) ; or margins lobulate, lobules about 1.5 mm broad, simple or sometimes digitately branched, each bearing turgid sorelia at its apex (fig. 4) ; margins sometimes with black, mostly unbranched, up to 3 mm long, marginal cilia (var. *ciliata* Duby).

Underside of the thallus black, smooth or wrinkled, bearing simple, short, scattered (occasionally dense), black rhizinae up to 1.5 cm in length. Tips of the lobes, often shining brown, with or without rhizinae ; when present, the youngest rhizinae lie at the apices of the lobes.

No apothecia and pycnidia have been observed in the material examined. They are very rarely met with in this species.

PARMELIA PERFORATA (FIGS. 3, 7-10)

Thallus greenish or whitish grey, foliose, crumpled and lobate, dorsiventral, up to 25 cm in diameter ; orbicular to irregular in outline, somewhat like *P. perlata*, but without soredia and isidia. Surface smooth, heavily maculate (spotted with minute, faint, whitish dots) with a network of wrinkles generally in the central (older) portions. Lobes straggling (not much elongated), branched, up to 2 cm wide (occasionally imbricately arranged), with rounded, subentire, crenate or irregular margins ; tips (often ascending up to 2 cm), with black, unbranched (sometimes branched), up to 5 mm long, marginal cilia (fig. 7).

Underside of the thallus black and wrinkled, with shining brown margins which bear a few to many convex protuberances (caused by pycnidia above). Rhizinae sparsely distributed, black, up to 3 mm long unbranched.

Apothecia, up to 2.4 cm in diameter, common, subsessile or pedicellate ; the pedicels more or less corrugated, hollow, up to 1 cm long (fig. 8). Mature apothecia round, deeply concave (cup-shaped) or plain and perforated in the centre, the perforations opening in the hollow pedicels ; with entire, crenate, dissected or irregularly incised margins, incisions deep, sometimes reaching up to the perforation. Back of the apothecia smooth or undulate. Disc chestnut-brown.

Pycnidia immersed, visible as black dots, often on minute, convex protuberances. Generally concentrated on the margins and apices of the lobes.

PARMELIA CIRRHATA (FIGS. 2, 11-14)

Thallus ash-or brownish-grey, horizontally ascending or fruticose, dorsiventral, up to 20 mm in diameter. Surface smooth, sometimes slightly undulate. Thallus consists of short or elongated, narrow, strap-shaped laciniae, up to 3 mm broad, dichotomously branched (generally broadening to 5 mm before branching). Ultimate branches short with pointed or truncated tips (fig. 11) which are sometimes brownish. Margins incurved, sometimes so deeply as to make the laciniea more or less cylindrical in appeatnce (var. *fistulata* (Tayl.) Zahlbr.).

Underside of the thallus black (brown in the outer younger laciniae), generally rugose, bearing black, simple or branched rhizinae, 0.5-1.0 mm long ; rhizinae dense or sparsely distributed, sometimes absent, occasionally confined to the margins only (var. *vermicularis* Asahina).

Apothecia (fig. 14) up to 7 mm in diameter, numerous or only a few, solitary or almost clustered at maturity ; subterminal, sessile or with more or less currugated and hollow pedicels. Apothecia round, slightly to deeply concave with entire, crenate, or incised margins at places. Margins inflexed and in incised state imparting the apothecium an irregular shape. Back of the apothecium undulate to smooth. Disc chestnut-brown.

Pycnidia immersed, visible as black dots, concentrated more on the ultimate branches.

MICROSCOPIC CHARACTERS (FIG. 6)

The histological structure of the thallus in general is similar in the three species of *Parmelia*. The thallus in vertical sections is heteromerous and is differentiated into the upper and the lower cortex (uc, lc), a gonidial layer (g) and a medulla (m). The upper cortex, together with the superficial layer of dead cortical cells forming the upper cuticle (u cl), consists of a compact layer of interwoven hyphae which often from paraplectenchymatous tissue of short cells. Below it is a layer of algal symbiont (gonidial layer) where the hyphae are short-celled and tightly appressed to the algal cells. The medulla forms the bulk of the thallus. The hyphae in this region are loose, enclosing air spaces between them. They are long-celled, running mostly horizontally and sending out lateral branches forming upwards the gonidial layer and the upper cortex, and downwards the lower cortex. The lower cortex, together with the lower cuticle (lcl), is of short-called, black hyphae ; the cells here are so compact as to form the paraplectenchymatous tissue. The rhizinae arise from the lower cortex and consist of compact, parallel running, black hyphae with elongated cells.

The cells of the lichen hyphae have very thick, gelatinous walls and a narrow lumen containing cytoplasm.

Spores. Eight in each ascus, simple, colourless, and narrow to broadly-elliptical.

Conidia. Simple and elongated.

A comparison of the microscopic characters of the three species is given in Table I.

BAZAR SAMPLE OF CHHARILA

The bazar samples contain several species besides *P. perforata* and *P. cirrhata*. The main distinguishing characters of the three *Parmelia* aspecies and the adulterants are given in Table 2.

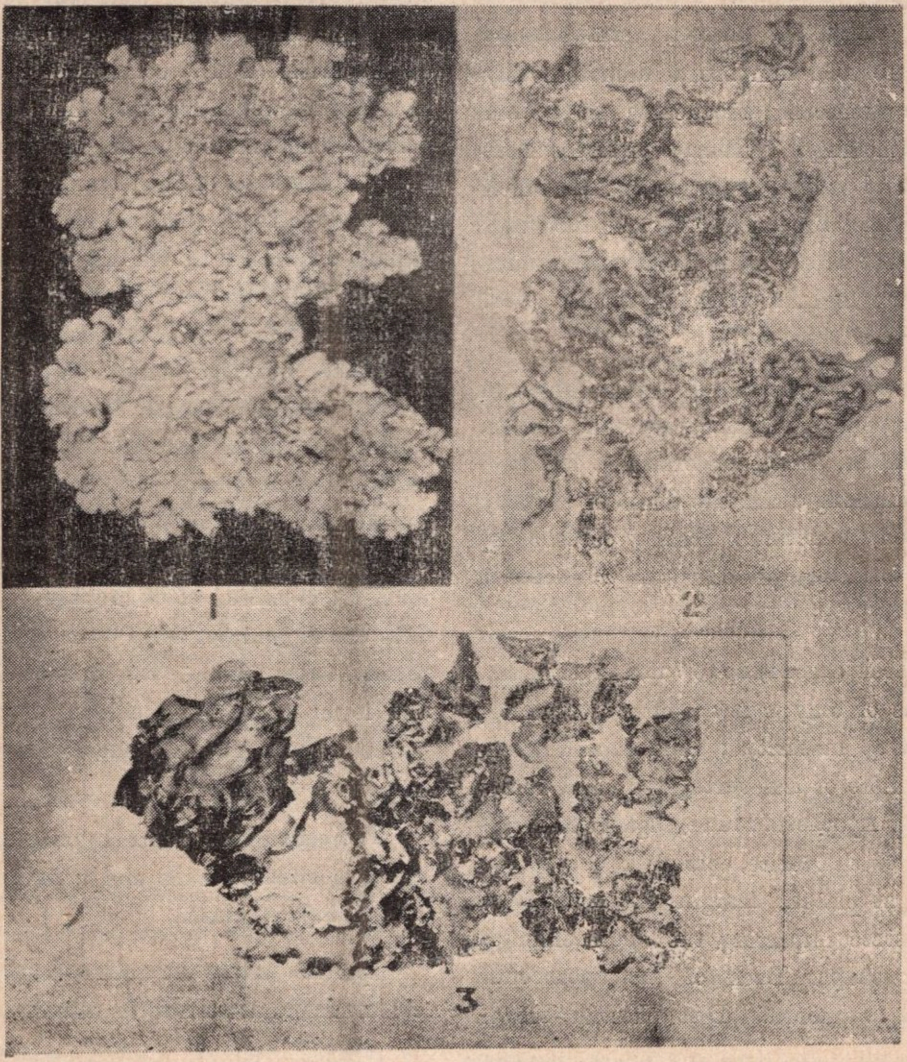

Plate I

Figs. 1-3, habit : 1-P *perlata*×0.75 ; 2-P. *cirrhata* ×0.75 ; 3-P. perforata×0.75 ; Figs. 4-6, P. perlata : 4-portion of lobe margin with lobules×2 ; 5-lobe×2 ; 6-vertical section of thallus×350. Figs. 7-10, *P. perforata :* 7-lobe×2 : 8-apothecium×1 ; 9-ascospores×500 ; 10-conidia×500. Figs. 11-13, *P. cirrhata :* 11-a portion of thallus×2 ; 12-ascospores×500 ; 13-conidia×500 ; 14-apothecium×1.25.

g, gonidial layer ; lc, lower cortex ; lcl, lower cuticle ; m, medulla ; uc, upper cortex ; ucl, upper cuticle.

N.B. :—The magnifications (figs. 4-13) conform to 1/2 reduction.

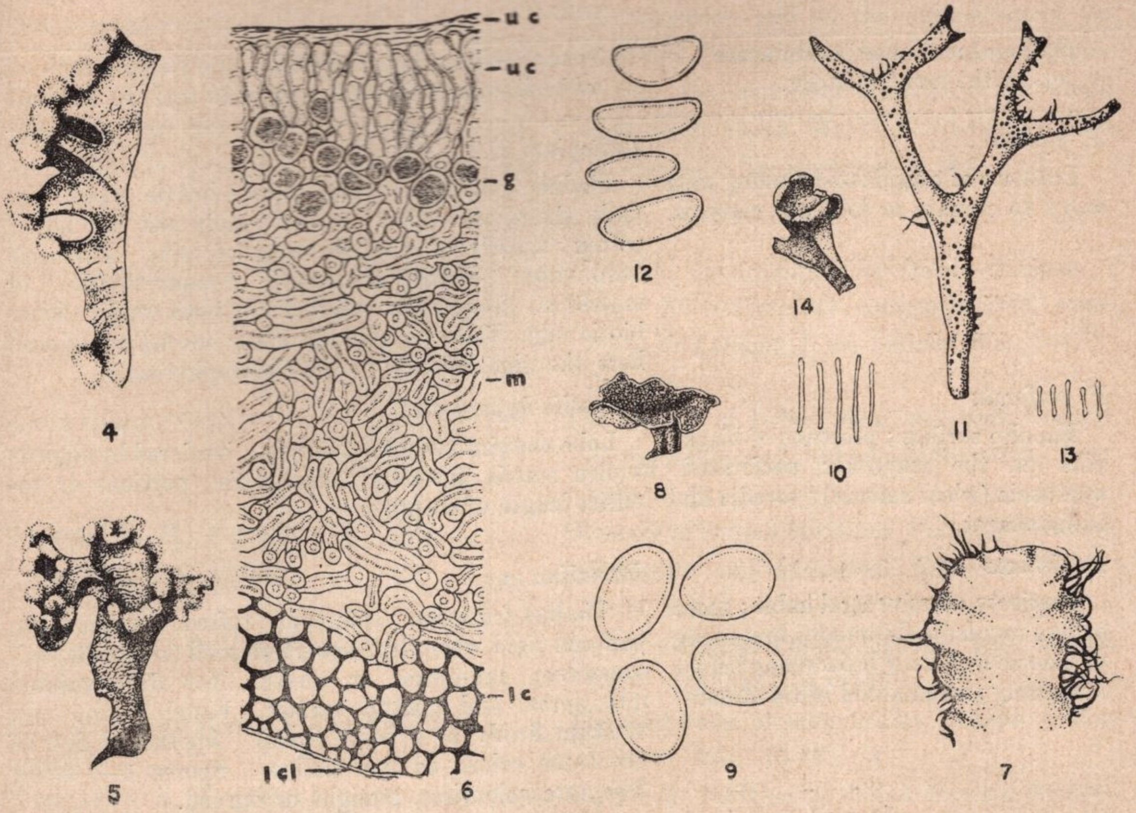

Plate II

TABLE 1

Species	Thickness					Ascospores	Conidia
	Thallus	Upper cortex	Gonidial layer	Medulla	Lower cortex		
P. perlata	125—400μ	15—40μ	20—40μ	40—300μ	20—40μ	—	—
P. perforata	125—250μ	20—40μ	20—40μ	60—150μ	20—40μ	Boradly elliptic to elliptic, thick-walled, 20-25 μ×12-20μ (fig. 9)	Accicular, 15-20μ×1μ (fig. 10)
P. Cirrhata	120—320μ	15 40μ	20—45μ	50—220μ	20—40μ	Elliptic, straight to slightly curved, 20-26 μ×1 I-10μ (fig. 12)	Linear, slightly swollen at ends, 6-9 μ×1μ (fig. 13)

TABLE 2

Species mentioned in literature under the name *chharila*.	Species (adulterants ?) found in the Bazar sample of *chharila* apart from *P. perforata* and *P. cirrhata*
P. perlata Presence of turgid sorelia along with wavy to crenate or lobulate margins.	*Leptogium sp.* Thallus gelatinous when moist, brittle when dry. Only the upper cortex present (rarely also the lower) cortex, usually of a single layer of cells. Apothecia uncommon. Spores colourless, 1-many-septate or muriform, frequently pointed at both ends. Symbiotic alga *Nostoc*. (In the other species mentioned here the alga belongs to the Chlorophyceae.)
P. perforata Maculte surface ; presence of black cilia on the margins ; perforated apothecia (when mature) ; soredia and isidia absent.	*Parmelia hyporysalea* Lobe margins undulate to wavy, bordered by slightly swollen sorelia covering considerable portions or the entire length of margins.
P. cirrhata Fruticose, dorsiventral habit ; more or less regular dichotomous branching of lacinae and their broadening before branching ; soredia and isidia absent.	*Ramalina spp.* Thallus fruticose, commonly tufted, cartilaginous, stiff and rigid when dry, erect, flattened (strap-shaped), sometimes sub-terate or terate. Not differentiated into dorsal and ventral surface. Fixed to the substratum firmly at a point (base). Apothecial disc of the same colour as the thallus. Spores 1—, rarely 3-septate colourless, straight or curved.
	Usnea spp. Thallus fruticose, erect or pendulous terate or sometimes angular, often thread-like, firmly attached to the substratum at a point (base). Cortical layer horny, composed of interwoven hyphae. Medulla a thin layer with a white central cord of strong walled hyphae. When in fruit, radiating hairs or fibrils commonly present on the apothecial margin. Spores colourless and simple.
	Anaptychia sp. Thallus foliose or fruticose, dorsiventral, often ciliate at margins. Upper cortex and the lower, whenever present, of interwoven hyphae (not paraplectenchymatous). Spores brown, thick-walled, 1-septate.

Summary

Chharila is a crude lichen drug used by both Ayurvedic and Unani systems of medicine in India. The macroscopic and microscopic characters of three species of *Parmelia* (*P. perlata*, *P. cirrhata* and *P. perforata*) believed to constitute the drug are described together with the distinguishing characters of the species found as adulterants in the bazar sample.

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CHEMICAL EXAMINATION OF VANGA (TIN)

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Introduction

Vanga is referred as '*Trapu*' in Rudraprasna and is known to exist from Vedic period. It is classified as a dhatu (metal) in Rasa Sastras and used in medicine.

Two varieties are mentioned one as *Khuraka* or *Kshuraka* and the other as *Misraka*. For medicinal purposes the former is considered as good.

Pure white, soft (*mridu*), smooth (*Snigdha*) quick-melting, soundless when dropped and heavy one is said to be *Khuraka vanga* and the one with blackish-white colour is *Misraka*.

It is bitter and saltish in taste, easily digestible, laxative, *ushna veerya* and causes dryness (*ruksha*).

It tones up appetite, digestion, creates taste for food, improved the quality and quantity of semen and rejuvinates the system on the whole.

Besides it is therapeutically used in following diseases :—*Kshaya* (Emaciation), *Prameha* (urinary disorders), ulcers, Intestinal worms, and in Anaemia, It is good in *Kapha-Dosha* and *Pitta-Prakopa*.

If not properly processed it will cause when taken the disorders, mentioned above and skin diseases, and gastritis.

Materials and Methods

The general procedures adopted for the preparation of Vanga bhasma is as follows :—

PURIFICATION

Molten tin (12 kg) is poured into 5 kg of *Madhuka* taila (Oil of *Madhuka indica*), containing 0.5 kg of ammonium chloride (Navasara) at room temperature. The solidified metal is again melted and poured in the oil. The process is repeated seven times.

PREPARATION

Purified Vangam is melted in a wide iron pan. Then the powders of *Tintrini twak* (*Tamarindus indica*), *Aswastha twak* (*Ficus religiosa bark*), *Apamargam* (*Achyranthes aspera*) and *Thalapotakam* (*Cassia auriculata*), each in amounts equal to 1/4 the quantity of the *Vangam* taken, are added to the pan, little by little, stirring the contents with an iron laddle. This process is continued till the metal becomes powderly. If the quantities of the above mentioned drugs are not

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found sufficient, further quantities may be added till the metal is evenly powdered. Then *shodhita thalakam* is taken equal to the quantity of the *Vangam*, so powdered, ground with the *Jambeeraswarasa* (lamen juice), made into small cakes, dried, kept in *sharava samputam* and subjected to *putam* with 50 cow-dung cakes. Ten *putam* are sufficient to convert it into a good bhasma.

CHEMICAL INVESTIGATION

Qualitative analysis on the raw drug (tin metal) and the purified raw drug showed the presence of tin and negligible quantity of iron. The prepared drug (*bhasmas*) were found to contain oxide of tin as the major constituent when different samples prepared in different batches were analysed qualitatively. Silica, sulphate, sulphide, arsenic, iron, calcium, magnesium and manganese are found to be present in varying amounts. Copper is present from trace quantities to small amounts in different samples; lead and aluminium were found to be present in traces.

ANALYSIS OF RAW AND MEDICALLY PURIFIED MATERIALS

1 g of the sample was dissolved in nitric acid and dehydrated. The dehydrated mass was heated with dilute nitric acid and filtered through W. No. 40. The residue was dried and incinerated; the amount of pure stannic oxide present can be determined by quantitatively volatilising it as the iodide by treatment with ammonium iodide. (Vogel, 1961). The residue left over was fused with potassium bisulphate and the iron estimated colorimetrically as the thiocynate.

SHODHITA THALAKAM

Shodhita thalakam was analysed qualitatively as it is being added during the preparation of the *bhasma* and was found to be the sulphide of arsenic.

0.5 g of the sample was brought into solution by refluxing with 1 : 1 nitric acid. The solution was made upto 250 ml after filtration through W. No. 41. The insoluble portion was determined by ashing the filter paper.

Arsenic was estimated as magnesium ammonium arsenate ($Mg\ NH_4\ AsO_4.\ 6H_2O$) by adding solid ammonium chloride and magnesia mixture to an acid solution of the sample made acidic with hydrochloric acid. The volume of the solution was kept 60 to 70 ml for each 0.1 g of arsenic present. Filtered through a weighed sinter crucible, washed well with 1 : 25 ammonia solution till free from chloride and finally with 95% alcohol. It was dried in a vacuum desiccator and weighed as $MgNH_4\ AsO_4\ 6H_2O$ which contain 25.89% arsenic (Vogel, 1961).

Sulfate was estimated in suitable aliquots by precipitation as barium sulfate by addition of barium chloride.

ANALYSIS OF BHASMA

0.5 g of the sample was fused with caustic soda pellets; the cooled mass was extracted with water and dehydrated after acidifying with nitric acid. The residue was incinerated and heated with sufficient ammonium iodide to remove the tin present. The residue remaining was subjected to hydrofluoric acid to estimate the silica content. The residue still remaining was fused with sodium bisulphate and the iron content was estimated with standard dichromate. The solution was tested for copper and was found to be absent.

The filtrate from tin was neutralised with ammonia, acididified with dilute hydrochloric acid and determine the sulphur content as barium sulphate. Loss on ignition was estimated on 1 g of the sample Calcium magnesium, copper, manganese were determined by the following procedures.

0.5 g of the sample was separately fused with sodium hydroxide, treated with nitric acid and dehydrated as before. The mass was treated with dilute nitric acid and the residue washed throughly. The filtrate was oxidised with hydrogen peroxide and riron and maganese were precipitated as the hydroxides and washed with 1% ammonium nitrate. Manganese was estimated by the colorimetric method after oxidation with potassium periodate. (Treadwell and Hall, 1961). The filtrate from the ammonia group oxides was carefully evaporated to dryness and ignited to remove the ammonium salts. The residue was dissolved in dilute hydrochloric acid and made up to 50 ml Calcium and magnesium were estimated for known aliquots with standard ethylene diamine tetra acetric acid and the interference of copper was prevented by the addition of potassium cynide (Flaschka, 1964). Copper was estimated on suitable aliquots by treating with 10% ammonium chloride solution, 1 ml of 2N hydrochloric acid and 1 ml of 1% potassium ferrocynide and measuring the intensity of copper ferrocynide formed colorimetrically.

Arsenic content was determined as the trinchloride as described below :—

1 g of the sample was warmed with 5 to 10 ml concentrated sulphuric acid and treated with a gram of hydrazin sulphate. The solution was cooled and diluted with 10 ml of water. 70 ml of concentrated hydrochloric acid was added and the contents were distilled with a steady passage of carbon dioxide from Kipp's apparatus. Arsenic distails as $Ascl_3$ at 10°C and the distillation was continued till the volume was reduced to one third (Hillebrand and Lundell, 1959).

The solution was made up to 100 ml and the arsenic was estimated by (i) Iodimetry and (ii) Polarography.

(i) 50 ml of the solution was neutralised with sodium bicarbonate, 4 to 5 g excess and titrated against standard iodine using starch as indicator. (Vogel, 1961).

(ii) 1 to 2 ml of the made up solution was treated with 10 ml of a mixture of equal volumes of tartaric acid and 1 M hydrochloric acid and the arsenic content determined by polarography by comparison with standard solution of arsenic (1 mg of arsenic per C.C.). The arsenic content was read from the current voltage graph drawn by the automatic recording instrument (Haight, 1954). The results are furnished in table 1

Analysis of Vanga Bhasma in 9.26% hydrochloric acid

0.2 to 0.3 g of the bhasmas were soaked in 250 ml of 0.26% hydrochloric acid for twenty four hours and calculated the insolubles after drying at 100°-105°C.

The clear solution was concentrated and dehydrated. The stannic oxide was filtered after treating with very dilute nitric acid.

The residue was incinerated, treated with ammonium iodide and stannic oxide estimated.

Sulfate was estimated in the filtrate as barium sulfate. Calcium and magnesium were estimated using ethylene diaminetetra acetic acid. Iron was estimated colorimetrically. The results are furnished in table 2

TABLE 1

Analysis of Vanga Bhasma

S. No.	Name of drug	Percentages of									
		Stannic oxide	Arsenic	Total sulphur	Silica	Calcium	Magnesium	Iron	Copper	Manganese	Loss on ignition
I.	Vangam *Raw*	99.56 99.91 (As tin)									
II.	Vangam (medically purified)	97.56 (As tin)			0.4064						
III.	*Vanga bhasma*										
	Batch I	87.07	1.247(I) 0.980(P)	1.466	3.4950	1.489	0.287	1.019	0.509	0.0019	1.165
	Batch II	87.82	1.388(I) 1.120(P)	1.524	3.9590	1.737	0.615	0.886	0.012	0.0002	1.756
	Batch III	87.51	0.654(I) 0.473(P)	1.306	2.3770	1.198	0.245	0.551	0.027	0.0027	0.787
	Batch IV	89.87	0.536(I)	2.568	2.8660	1.499	0.291	0.231	0.012	0.0005	2.046
	Batch V	90.04	0.697(I)	1.522	2.8490	0.883	0.533	0.452	0.024	0.0006	1.350

I—Iodimetry

P—Polarography

TABLE 2

Analysis of Vanga Bhasma in 0.26% HCl.

S.No.	Sample No.	Percentage of							
		Weight taken	Stannic oxide	Sulphate	Calcium	Magnesium	Iron	Silica	Insoluble in 0.26% HCl
I.	*Vanga Bhasma*								
	Batch I	0.4703	0.425	3.779	1.511	0.2500	0.022	0.149	90.90
	Batch II	0.5007	0.539	3.174	1.545	0.4581	0.123	0.112	92.43
	Batch III	0.4956	0.363	2.619	1.170	0.2370	0.041	0.486	90.51
	Batch IV	0.4402	0.364	3.637	1.464	0.3550	0.214	0.228	94.69
	Batch V	0.4408	0.386	2.687	0.877	0.3550	0.021	0.113	95.10

TABLE 3.

Fineness of Vanga Bhasma (Sieve Analysis)

Mesh No. Aperture/U	200 76	170 89	150 104	120 124	100 152	85 178	72 211	60 251	44 353
	Percentage of particles passing through								
I. Vanga Bhasma									
Batch I	19.95	32.10	43.69	66.67	89.08	90.41	97.47	99.45	99.78
Batch II	15.31	22.52	29.45	55.74	84.59	87.67	96.67	99.80	100.00
Batch III	30.77	37.87	43.21	64.45	94.01	93.75	96.33	98.20	100.00
Batch IV	18.72	26.59	33.55	54.69	82.49	90.91	94.67	97.63	100.00
Batch V	7.82	11.60	14.77	30.29	56.22	77.33	92.91	96.08	99.53

FINENESS OF BHASMAS

Since the particle size of the drug influences the efficiency of the drug, sieve analysis of the samples was done using Endecott's British Test Sieves-London. The results are furnished in above table 3. The bhasmas were found to be a moderately fine powder. Since 75%-90% of the samples passed through sieve no. 85 where as more than 99% passes through sieve No. 44.

Results and Discussion

The raw drug (Vangam) and purified raw drug were found to contain 99 to 100%. tin. The bhasmas were found to contain 87 to 90% stanic oxide, 0.5 to 1.4% arsenic, 0.8 to 1.5% calcium, 0.2 to 0.6% magnesium, 0.2 to 1% iron probably in the form of oxides and total sulphur to the extent of 1.5%. Shodhita thalakam was found to contain 60% arsenic and 40% total sulphur. Only 10% of the sample was found to be soluble in 250 ml of 0.26% hydrochloric acid at room temperature, when kept for a period of 24 hrs. The soluble portion was found to contain 0.9 to 1.5% calcium, 0.2 to 0.5% magnesium, 0.02 to 0.04% iron, 2 to 4% sulfate, 0.3 to 0.4% tin and traces of copper and arsenic.

Summary

Chemical composition of Vanga bhasma drawn from 5 batches is reported. Analytical values for the raw and medically purified materials are also provided. Analysis was carried out in 0.26% hydrochloric acid as it is considered to be equivalent to gastric juice.

ACKNOWLEDGEMENT

Our thanks are due to Dr. Y. Kondal Rao for his keen interest, to Dr. B. Vaidyanathan and Miss S. Saradambal for helpful discussions and to Dr. D. Ramaswamy and his colleagues (C.L.R.I.) for polarographic data.

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STUDIES ON AYURVEDIC ZINC PREPARATION (JASAD BHASMA)

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(Received for publication on November 10, 1970)

Introduction

The various synonyms described for Zinc in the Indian system of medicine are *jasad, yashad, rangashadrishi, ritihatu, kharpar* etc. (Chunekar, 1969, Sharma, 1955). *Jasad bhasma* is described as cool, and used as expectorant astringent and in diseases caused by *kapha* and *pitta* (Sharma, 1955). It increases strength, virility and intllegence and is widely used in polyurea, cough, asthma consumptive diseases, boils, weeping wounds and skin infections (Sharma, 1955, Vagbhattacharya, 1939). When given with *arni* (*Premma integrifolia*), it increases appetite and with *gharita* it promotes vision. It is widely used with *swarna vanga* against nocturnal emission and with *ashoka* (*Saraca indica*) against menustrual disorders. It is extensively prescribed in the treatment of Jaundice (Mookerjee, 1929; Bhat, 1951; Chunekar, 1969).

No systematic study regarding the analysis of *Jasad bhasma* has been made. This paper deals with an account of its preparation and chemical analysis.

Materials and Methods

The *Jasad Bhasma* was prepared as follows in the laboratory and its physical and chemical characteristics were established.

SHODHANA OF JASAD

(Purification of Zinc) (Sharma, 1955)

The nolten shinning zinc was poured in a stream into a vessel containing lime water. The purified zinc so obtained was treated seven times in the same day.

PREPARATION OF JASAD BHASMA

(Sharma, 1955)

METHOD I

Shodhit Zinc (4.5 g) was melted in an iron dish and to it was added Apamarga powder (*Achyranthes aspera*) (44g) in small portions and with continuous stirring till zinc was reduced to powder (*Bhasma*). The powder was covered with an earthen pot and strongly heated to redness for 7 hours. The heating was stopped and the cold *jasad bhasma* (9.5 g) was collected.

A sample of the *jasad bhasma* prepared by the method I was procured from the

Ayurvedic Pharmacy, Banaras Hindu University and the results of its analysis were compared with those of the sample of the Bhasma prepared in the laboratory as follows :

Analysis

The zinc used in the preparations of Bhasma was assayed for its total zinc content (Vogel, 1939) and its was found to be 98%. The results of the analysis are tabulated below (Table 1).

TABLE 1.

Analysis	Jasad prepared in the laboratory	Jasad procurred from the Ay. Pharmacy, B.H.U.
Colour	Brownish yellow	Deep brownish yellow
pH of 2% aq. suspension	10.1	7.5–8.0
% acid insoluble ash	8–9	12–13
% water soluble content	22–23	1.5–2.0
% iron exide (ic)	10–10.5	15–15.5
% Zinc oxide	55–56	60–61
% Zinc	0.9–1.0	10–11
Density	2.30	4.33

METHOD II

Shodhit Zinc (5 g) was melted in an iron dish and was continuously stirred with an iron rod till the whole thing was reduced to powder (Bhasma). It was sieved through a muslin cloth and the residue again heated and sieved and the process was repeated till the whole of the zinc passed through the muslin cloth as Bhasma (6.0 g).

Analysis

Jasad Bhasma prepared by method II is a grey coloured amorphous powder insoluble in water and soluble in dilute mineral acids. The pH of 2% aq. suspension is 6.0 and its density is 4.08. On analysis it gave zinc oxide, 97-97.5%; and Zinc, 0.6-0.7%.

METHOD III

Shodhit Zinc (5g) was melted in an iron dish. To it was added shodhit mercury (5g) and the mixture was immediately transferred to a pestle and mortar and triturated thoroughly till a homogenous amalgam was obtained. The amalgam was washed well with an expressed juice of lemon. The washed amalgam was again thoroughly triturated with shodhit sulphur (5g) and heated at 500°C for five hours in an air tight vessel. Upon cooling Jasad Bhasma (6.1 g) was collected.

Analysis

The *jasad bhasma* prepared by method III is an amorphous cream coloured powder insoluble in water and soluble in dil. mineral acids. The pH of 2% aq. suspension is 6.0 and its density is 5.59. On analysis it gave Zinc oxide, 98%; and mercuric exide in Traces (0.005—0.01%).

The process of heating the Bhasma for five hours at 500°C was repeated five times and after each heating the number of particles per miligram determined. The results are given below (Table–2).

TABLE 2

No.	Process	No. of particles per mg. of Bhasma
a.	Heating for 5 hours	$0.\ 2\times10^{7}$
b.	Repeating (a) twice	0.27×10^{7}
c.	Repeating (a) thrice	0.88×10^{7}
d.	Repeating (a) four times	1.28×10^{7}
e.	Repeating (a) five times	1.30×10^{7}

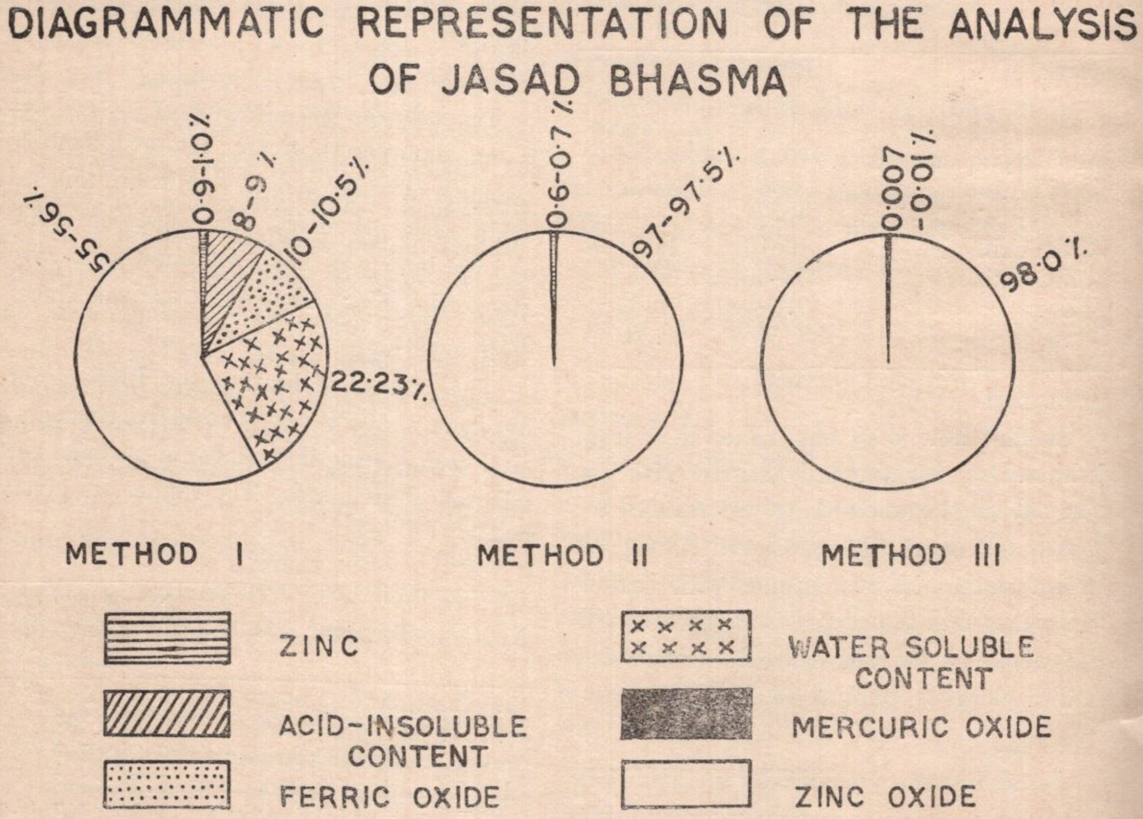
The analytical findings of the Jasad Bhasma prepared by various methods have been diagrammatically represented (Plate I)

PRELIMINARY MICROBIOLOGICAL INVSTIGATIONS

Fungicidal activity of the *bhasma* were determined by the modifications of the cup plate assay method (Reddish and Wales 1948). The aqueous suspension of the *bhasma* in Tween 80 was used for the purpose. The *jasad bhasma* showed an inhibition index at 5 mgs. per millilitre against *Aspergillus flavus*, *Epidermophyton floccosum* and *Microsporum gypseum*. Further imicrobiological studies regarding this are in progress.

Discussion

The Jasad Bhasma prepared by the above mentioned methods show a high content of Zinc oxide formed by the exidation of Zinc during the process of heating. However, the one prepared by the method I shows the presence of a considerable quality of ferric oxide presumably obtained form Apamarga. The pH of the aqueous suspension is found alkaline which may be due to the presence of Inorganic sodium and potassium salts of Apamarga. The density of the sample collected from the Ayurvedic Pharmacy, B.H.U. is almost twice than that of the sample pre-



PLTE I

pared in the laboratory, owing to the presence of large amount of metallic zinc, that has remained unoxidized. The *bhasma* prepared by methods II and III were found to be insoluble in water and therefore the pH of the aqueous suspension is about 6.0. The presence of traces of mercuric oxide in the *bhasma* prepared by method III can be accounted for by the partial retention of mercurry oxide which does not volatilize completely even after heating. The process of alternate incineration (heating) and cooling helps in the disintigration of the particles of Bhasmas and this has been demonstrated above.

Summary

The paper deals with the preparation of *jasad bhasma* by various methods (Sharma, 1955) and their chemical analysis. The analysis of *jasad bhasma* prepared by method I shows; density, 2.30; Zinc, 0.9-1.0%; Zinc oxide 55-56% ferric oxide, 10-10.5%; water soluble content, 22-23% and acid insoluble content 8-9%. The *bhasma* prepared by method II gave an analysis, Zinc, 0.6-0.7%, and Zinc oxide 97-97.5% whereas the analysis of the *bhasma* prepared by method III gave Zinc oxide 98% and mercuric oxide 0.005-0.01% (Traces). The preliminary microbiological investigations indicate that the Jasad Bhasma exerts a fungicidal effect.

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Short Research Communication

PRELIMINARY PHARMACOLOGICAL INVESTIGATION ON THE GLYCOSIDES OF TECOMELLA UNDULATA (RUGTRORA)

[Received for publication on September 14, 1970]

Introduction

Tecomella undulata (G. Don.) Seem, N. O. Bignoniaceae, known in Sanskrit as *Rohi*, is used in syphilis and disorders of liver and spleen. No pharmacological or chemical studies have been reported on this plant (Chopra, Nayar and Chopra, 1956; Nadkarni, 1954).

Dried and powdered bark of *T.undulata* was thoroughly defatted with petroleum ether and then with benzene and the defatted material was extracted with chloroform. The chloroform extracted material was finally extracted with water. The water soluble portion showed the presence of atleast three glycosides on thin layer chromatography, and was subjected to pharmacological screening.

The extract produced a moderate to marked relaxation of isolated ileum of rabbit, guineapig and rat in concentrations of 1-10 mg/ml. In these concentrations it also produced marked reduction of spontaneous rhythmic contractions of isolated uterus of rat. It showed a non-specific spasmolytic action against spasms induced by different spasmogens on various isolated tissues. The spasmolytic ED_{50} has been calculated in each case and given in Table I.

TABLE I

Spasmolytic ED_{50} of the Glycosides of T.undulata against different Spasmogens

Spasmogen	Tissue	Spasmolytic ED_{50} (mg/ml)
Acetylcholine bromide (0.1 mcg/ml)	Guineapig ileum	7.2
Histamine dihydrochloride (0.1 mcg/ml)	Guineapig ileum	3.0
Barium chloride (0.1 mg/ml)	Guineapig ileum	1.2
5-Hydroxytryptamine (0.1 mcg/ml)	Rat uterus	0.83
Oxytocin (0.001 U/ml)	Rat uterus	0.75

On anaethetised dog's (Pentobarbitone sodium, 35 mg/Kg I.P.) blood pressure, respiration and intestine *in situ*, the drug produced moderate relaxation of intestine with no significant effect on blood pressure and respiration.

The drug did not show any significant effect on perfused frog heart (upto 20 mg), frog's rectus abdominis muscle (upto 10mg/ml) central nervous system of albino rat (upto 25 mg/100g I.P.), faecal and urinary output of albino rat (upto 25 mg/100 g I.P.) and biliary flow in dog (upto 25 mg/kg I.V.).

It was also devoid of any anti-inflammatory activity (25 mg/100 g. I.P. against carrageenin induced acute pedal inflammation in albino rats). There was no observable toxicity upto a dose of 50 mg/100 g.

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Short Research Communication

STUDIES IN ASHTAVARG CHROMATOGRAPHIC EXAMINATION OF SUGARS IN THE BULB OF LILIUM POLYPHYLLUM

(Received for publication on August 18, 1970)

Introduction

Lilium polyphyllum D. Don (Hindi Kakoli-Kshir Kakoli) a member of family liliaceac grows in the Himalayas at an altitude of 2700-3000 m. The fleshy scales of the bulb of the plant are used in the indigenous system of medicine as restorative, tonic, spermatic and lactogenic. It is an important ingredient in *Chayavanprasa* a popular Ayurvedic tonic. The bulb, in the fresh state, is white, odourless and sweet. Externally it looks like the bulb of garlic.

In chromatographic examination descading papers chromatographic technique with Whatman No. 1 filter paper and n-butanol; acetic acid water (4 : 1 : 5) as developing solvent was employed.

10 g. of the fleshy scales of the bulb were cut into small pieces and extracted with 80% alcohol, 30% alcohol and finally with water. The combined extracts was heated on a water bath to remove alcohol. An aliquot of this was used in chromatographic separation of sugars.

The above extract was allowed to flow simultaneously with authentic samples of sugars. The chromatograms were air dried for 24 hrs. They were then sprayed with Tollens reagent. When dried these reaction conditions caused the formation of dark brown black spots.

The comparison of Rf values revealed the presence of glucose and xylose in the bulb.

TABLE

Rf values of sugars

Sugar	Rf
D-glucose	0.21
X tkise	0.26

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Gurukul Kangari
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Letter to the Editor

AYURVEDA

Dear Sir,

Ancient Indian Medicine, though based on terminology, different from that of modern medicine, is based on strictly logical deductions, on scientific grounds and minute observation. Medical experience and knowledge gathered since ancient times have led to a high level of differentiation and a wide spectrum of therapeutical experience.

Ayurvedic system of medicine is still applied amongst a great percentage of population throughout India (officially estimated to be over 85%). It uses natural and crude drugs which are, for the most part, non-toxic.

It uses highly individualised physico-therapeutical treatment of great variety. It takes into consideration the entity of the individual, its constitution, environment, its seasonal and psychological condition, all of which form the pattern of behaviour.

Ayurvedic medicine treats the patient rather the disease. It emphasizes since time immemorial on psychosomatic approoch. Ayurveda works on preventive and curative lines. It differentiates functional disorders (9 imbalances)-*doshic* from the organic-*dhatus*- and has specialised therapies for chronic degenerative diseases and or the care of convalescence. Longevity, rejuvenation and prevention play a significant role in the Ayurvedic System of Medicine. But also acute diseases are treated efficiently in Ayurvedic hospital wards-as I have seen myself.

The mounting cure of toxic, degeneraive, chronic and malignant diseases of our time has shown that modern allopathic treatments, their high scientific and technical advances notwithstanding, seem to have reached the limit. In order to prevent drug-resistence and the development of immunity against them, the need to look for utilization of natual and non-toxic preventive and curative measures has become urgent. To my mind it appears that Ayurvedic medicine may meet this need and its approach to the solution of the problems of health and disease deserves to be scientifically acknowledged.

The Bircher-Benner Clinic of Zurich, Switzerland, founded by the late Dr. Bircher-Benner (in 1897) has been working on lines somewhat similar to the Ayurvedic system. Working at this clinic for over 30 yeass, I have therefore been interested in following the theory and practice of Ayurveda, as it appears in its native environment. After going through the related literature and spending more than two months in India for an on-the-spot-study of the system, I have come to the conclusion that the Ayurvedic system of medicine is a most valuable medical heritage and an interesting domain in the field of medicine, which is not only worth to be studied but also to be introduced in Europe and further abroad. Some of the European countries are already showing growing interest in it.

In the course of my study tour in India, I found that Ayurvedic treatment has proved efficient in a large number of patients whom I personally saw and examined. In a number of these cases, treatment with modern medicine had failed. Ayurvedic System of Medicine undoubtedly offers both theoretical and practical possibilities which call further scientific study and investigation as well as application by modern medicine.

Collaboration between modern physicians and Ayurvedists, mutual exchange of knowledge, experience and research, as seen in Indian centres ought to be taken into close consideration in other countries. The Indian Government has founded the Composite Drug Research Scheme (research in medicinal plants and herbs), distributed among 40 centres all over India, under the guidance of the Indian Council of Medical Research (I.C.M.R. and C.C.R.I.M.H), New Delhi. In this project Ayurvedic experts such as Pharmacognosists, internists, chemists (both organic and biochemical) and pharmacologists work together on Ayurvedic medicinal plants with a view to discover potent and valuable drugs from the vast Ayurvedic Pharmacopea. Ayurvedic concepts of drug composition ad drug action are critically examined and evaluatd in the light on modern chemical, biochemical, pharamacological and clinical sciences. This approach does obviously not intend to change the broad classical background of Ayurveda, but aims to introduce it into modern scientific thinking and treatment.

I have met a large number of such highly qualified experts trained in the two schools of medicine, and witnessed the research work carried out by them. They showed an excellent team spirit with experts of other scientific disciplines, such as Pharmacognosy, Internal medicine, Chemistry and Pharmacology. I have seen research work done which impressed me deeply. The excellent team spirit, as mentioned before, was felt in all scientific and clinical sections as well as in circuit meetings in Madras, Delhi, Varanasi, Bombay and Poona, i.e. in the centres of I.C.M.R. and C.C.R.I.M.H.

I would now like to express my sincere gratitude to the Ministry of Health in the Indian Government for having given me the opportunity to make a detailed study of the important reseraches that are being carried out in several centres and to see the significant results achieved so far. On behalf of foreign countries and their physicians I sincerely wish that these researches may enable other countries to profit from the ancient Indian Medicine and that foreign physicians and scientists may participate in them.

Some European countries, such as Germany, England and Austria, have already begun to show interest in Eastern medicine. No doubt, Switzerland, too, will follow. But only Indian scientists, who combine Ayurvedic and modern medicine, will be in a position to cummunicate to European physicians and scientists their ideas about Ayurveda in the language of modern science.

Sd/- Dr. med. Dagmar Liechti-
von Brascl Allg. Med. F.M.H.
Head Physician of Bircher-
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Dr. (Mrs.) Liechti came on a visit to India as the guest of the Government of India to study Ayurveda, its practice and research. After visiting various Institutions, Colleges and Centres, during period of January 23 to March 29th 1970, she sends her personal impressions on the status and scope of Ayurveda today.

Chief Editor